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THE JOURNAL OF EDUCATIONAL PSYCHOLOGY

THE MEASUREMENT OF EFFICIENCY IN READING.

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Introduction.—The current movement for measuring school products is one of the three or four most important fields of investigation in the scientific study of educational problems. Very material progress has been made during the last five years in the endeavor to devise accurate methods for measuring the actual efficiency of pupils in school studies. The first substantial contributions¹ were made by Thorndike in his scale for measuring handwriting and by Courtis in his tests for measuring arithmetical ability. These have been followed by Hillegas' scale for English composition, by Ayres' scale for handwriting, by Thorndike's scale for drawing, and by Buckingham's study of spelling ability. Methods for measuring achievement in other studies are under way, so that we now have fairly accurate tests and scales for measuring efficiency in most of the fundamental elementary school studies and in two or three high-school subjects.

¹E. L. THORNDIKE. *Handwriting*. 1910. Columbia University.

S. A. COURTIS. *Report on Educational Aspects of the Public School System of the City of New York*.

M. B. HILLEGAS. *A Scale for the Measurement of Quality in English Composition by Young People*. 1913.

L. P. AYRES. *A Scale for Measuring the Quality of Handwriting of School Children*. Russell Sage Foundation, New York.

E. L. THORNDIKE. *The Measurement of Achievement in Drawing*. 1913.

B. R. BUCKINGHAM. *Spelling Ability*. Columbia University.

It is unnecessary to point out the scientific and practical value of such investigations for all who are connected with the schools—administrators, supervisors, teachers, pupils and students of educational problems. These tests will furnish the tools for evaluating quantitatively the results of methods and factors in teaching and learning, and for examining various aspects of efficiency of instruction and administration of school systems.

Essential Elements in Reading.—Adequate measurements of any complex mental functions, such as those involved in school studies, require first of all an analysis of the functions into their essential constituents, and, second, the preparation of accurate tests for each of these elements. From the practical point of view, we learn to read in order to obtain information. Obviously, then, the chief elements in reading are (1) the comprehension of the material read, (2) the speed of reading, and (3) the correctness of the pronunciation. The first two are the most important so far as reading strictly is concerned, since we learn to read for our own individual use. For this reason, such factors as intonation, expression, pauses and the like are relatively insignificant. We use silent rather than oral reading in practical life.

Methods of Testing.—The speed of reading may be measured rather easily by determining the amount of a certain kind of text that can be read in a given period of time, for example, the number of words read per minute, or preferably per second. Comprehension perhaps cannot be determined quite so easily. In the tests to be described presently the method adopted consists in reproducing the thought in writing immediately after the reading.

The tests as finally developed will be described first and the various critical points concerning their technique and reliability will be considered later.

A very important matter to take into account in testing the reading capacity of children is the extent of their vocabulary and the range of their ideas. It therefore became necessary to select a graded series of passages as test material. Eight passages (see following pages) were chosen from various graded readers, one for each of the eight grades. The pas-

sages were so selected that the increase in difficulty from one sample to the next would represent fairly uniform steps. This selection was guided largely by the differences between the readers used in the different grades. Thus selection 1 was chosen from a typical first reader, selection 2 from a second reader, etc. Since we do not know the actual difficulty of these passages, and since it is rather important to measure the increase of reading capacity from grade to grade, each grade was tested with the passage designed for it and also with the passage designed for the grade next below it. Thus the fourth-grade pupils were tested with selection 4 on one day and with selection 3 on the next day. The third grade was tested with selections 3 and 2, etc. In this manner a direct comparison of each grade with the grade below it or above it can be made on the basis of the same test material.

No. 1.²

Once there was a little girl who lived with her mother.
They were very poor.
Sometimes they had no supper.
Then they went to bed hungry.
One day the little girl went into the woods.
She wanted sticks for the fire.
She was so hungry and sad!
"Oh, I wish I had some sweet porridge!" she said.
"I wish I had a pot full for mother and me.
We could eat it all up."
Just then she saw an old woman with a little black pot.
She said, "Little girl, why are you so sad?"
"I am hungry," said the little girl.

No. 2.

Betty lived in the South, long, long ago. She was only ten years old, but she liked to help her mother.

She had learned to do many things. She could knit and sew and spin; but best of all she liked to cook.

One day Betty was alone at home because her father and mother and brother had gone to town to see a wonderful sight.

The great George Washington was visiting the South. He was going from town to town, riding in a great white coach trimmed with shining gold. It had leather curtains, and soft cushions. Four milk-white horses drew it along the road.

Four horsemen rode ahead of the coach to clear the way and four others rode behind it. They were all dressed in white and gold.

²Selections 1 and 2 were printed in 14-point, 3 and 4 in 12-point, and the rest in 10-point type. The special blanks for making the reading tests may be obtained from the author, who will be glad to co-operate with teachers or superintendents of schools who may desire to make the tests.

No. 3.

Little Abe hurried home as fast as his feet could carry him. Perhaps if he had worn stockings and shoes like yours, he could have run faster. But, instead, he wore deerskin leggings and clumsy moccasins of bear skin that his mother had made for him.

Such a funny little figure as he was, hurrying along across the rough fields! His suit was made of war homespun cloth. His cap was made of coonskin, and the tail of the coon hung behind him, like a furry tassel.

But if you could have looked into the honest, twinkling blue eyes of this little lad of long ago, you would have liked him at once.

In one hand little Abe held something very precious. It was only a book, but little Abe thought more of that book than he would have thought of gold or precious stones.

You cannot know just what that book meant to little Abe, unless you are very fond of reading. Think how it would be to see no books except two or three old ones that you had read over and over until you knew them by heart!

No. 4.

The red squirrel usually waked me in the dawn, coursing over the roof and up and down the sides of the house, as if sent out of the woods for this very purpose.

In the course of the winter I threw out half a bushel of ears of sweet-corn on to the snow crust by my door, and was amused by watching the motions of the various animals which were baited by it. All day long the red squirrels came and went, and afforded me much entertainment by their maneuvers.

One would approach, at first, warily through the shrub-oaks, running over the snow crusts by fits and starts like a leaf blown by the wind. Now he would go a few paces this way, with wonderful speed, making haste with his "trotters" as if it were a wager; and now as many paces that way, but never getting on more than half a rod at a time.

Then suddenly he would pause with a ludicrous expression and a somerset, as if all eyes in the universe were fixed on him. Then, before you could say Jack Robinson, he would be in the top of a young pitch-pine, winding up his clock and talking to all the universe at the same time.

No. 5.

Once upon a time, there lived a very rich man, and a king besides, whose name was Midas; and he had a little daughter, whom nobody but myself ever heard of, and whose name I either never know, or have entirely forgotten. So, because I love odd names for little girls, I choose to call her Marygold.

This King Midas was fonder of gold than anything else in the world. He valued his royal crown chiefly because it was composed of that precious metal. If he loved anything better, or half so well, it was the one little maiden who played so merrily around her father's footstool. But the more Midas loved his daughter, the more did he desire and seek for wealth. He thought, foolish man! that the best thing he could possibly do for his dear child would be to give her the immenseness pile of yellow, glistening coin, that had ever been heaped together since the world was made. Thus, he gave all his thoughts and all his time to this one purpose. If ever he happened to gaze for an instant at the goldtinted clouds of sunset, he wished that they were real gold, and that they could be squeezed safely into his strong box. When little Marygold ran to meet him, with a bunch of buttercups and dandelions, he used to say, "Poh, poh, child! If these flowers were as golden as they look, they would be worth the plucking!"

And yet, in his earlier days, before he was so entirely possessed of this insane desire for riches, King Midas had shown a great taste for flowers.

No. 6.

In a secluded and mountainous part of Stiria there was in old times a valley of the most surprising and luxuriant fertility. It was surrounded on all sides by steep and rocky mountains, rising into peaks which were always covered with snow, and from which a number of torrents descended in constant cataracts. One of these fell westward over the face of a crag so high that, when the sun had set to everything else, and all below was darkness, his beams still shone full upon this waterfall, so that it looked like a shower of gold. It was, therefore, called by the people of the neighborhood, the Golden River. It was strange that none of these streams fell into the valley itself. They all descended on the other side of the mountains, and wound away through broad plains and past populous cities. But the clouds were drawn so constantly to the snowy hills, and rested so softly in the circular hollow, that in time of drought and heat, when all the country round was burnt up, there was still rain in the little valley; and its crops were so heavy and its hay so high, and its apples so red, and its grapes so blue, and its wine so rich, and its honey so sweet, that it was a marvel to everyone who beheld it, and was commonly called the Treasure Valley.

The whole of this little valley belonged to three brothers called Schwartz, Hans and Gluck. Schwartz and Hans, the two elder brothers, were very ugly men, with overhanging eyebrows and small dull eyes.

No. 7.

Captain John Hull was the mint-master of Massachusetts, and coined all the money that was made there. This was a new line of business, for in the earlier days of the colony the current coinage consisted of gold and silver money of England, Portugal, and Spain. These coins being scarce, the people were often forced to barter their commodities instead of selling them.

For instance, if a man wanted to buy a coat, he perhaps exchanged a bearskin for it. If he wished for a barrel of molasses, he might purchase it with a pile of pine boards. Musket-bullets were used instead of farthings. The Indians had a sort of money called wampum, which was made of clam-shells, and this strange sort of specie was likewise taken in payment of debts by the English settlers. Bank-bills had never been heard of. There was not money enough of any kind, in many parts of the country, to pay the salaries of the ministers, so that they sometimes had to take quintals of fish, bushels of corn, or cords of wood instead of silver or gold.

As the people grew more numerous and their trade one with another increased, the want of current money was still more sensibly felt. To supply the demand the general court passed a law for establishing a coinage of shillings, sixpences, and threepences. Captain John Hull was appointed to manufacture this money, and was to have about one shilling out of every twenty to pay him for the trouble of making them.

No. 8.

The years went on, and Ernest ceased to be a boy. He had grown to be a young man now. He attracted little notice from the other inhabitants of the valley; for they saw nothing remarkable in his way of life, save that, when the labor of the day was over, he still loved to go apart and gaze and meditate upon the Great Stone Face. According to their idea of the matter, it was a folly, indeed, but pardonable, inasmuch as Ernest was industrious, kind, and neighborly, and neglected no duty for the sake of indulging this idle habit. They knew not that the Great Stone Face had become a teacher to him, and that the sentiment which was expressed in it would enlarge the young man's heart, and fill it with wider and deeper sympathies than other hearts. They knew not that thence would come a better wisdom than could be learned from books, and a better life than could be moulded on the defaced example of other human lives. Neither did Ernest know that the thoughts and affections which

came to him so naturally, in the fields and at the fireside, and wherever he communed with himself, were of a higher tone than those which all men shared with him.

By this time poor Mr. Gathergold was dead and buried; and the oddest part of the matter was, that his wealth, which was the body and spirit of his existence, had disappeared before his death, leaving nothing of him but a living skeleton, covered over with a wrinkled, yellow skin. Since the melting away of his gold, it had been very generally conceded that there was no such striking resemblance, after all, betwixt the ignoble features of the ruined merchant and that majestic face upon the mountainside.

No. 9.

To an American visiting Europe, the long voyage he has to make is an excellent preparative. The temporary absence of worldly scenes and employments produces a state of mind peculiarly fitted to receive new and vivid impressions. The vast space of waters that separates the hemispheres is like a blank page in existence. There is no gradual transition, by which, as in Europe, the features and population of one country blend almost imperceptibly with those of another. From the moment you lose sight of the land you have left, all is vacancy until you step on the opposite shore, and are launched at once into the bustle and novelties of another world.

In traveling by land there is a continuity of scene and a connected succession of persons and incidents, that carry on the story of life, and lessen the effect of absence and separation. We drag, it is true, "a lengthening chain," at each remove of our pilgrimage; but the chain is unbroken: we can trace it back link by link; and we feel that the last still grapples us to home. But a wide sea voyage severs us at once. It makes us conscious of being cast loose from the secure anchorage of settled life, and sent adrift upon a doubtful world. It interposes a gulf, not merely imaginary, but real, between us and our homes—a gulf subject to tempest, and fear, and uncertainty, rendering distance palpable, and return precarious.

The directions for administering the tests were as follows:

Explain to the pupils that they are to read silently as rapidly as they can and at the same time to grasp as much as they can, and that they will be asked to write down, not necessarily in the same words, as much as they will remember of what they read.

They should also be told not to read anything over again, but to read on continuously as rapidly as is consistent with grasping what they read.

Use for a given grade the test blank that bears the same number as your grade. For example, use number 4 with the fourth grade, number 5 with the fifth grade, etc. On the next day repeat the test in the same manner, but use the blank of the grade next below yours, that is, in the fourth grade use number 3, in the fifth grade use number 4, etc.

The blanks for the test should be distributed to the pupils *with the backs of the blanks up*, so that no one will be able to read any of the material until all are ready. Then give the signal "turn" and "start." Allow them to read *exactly thirty seconds*. Then have the pupils make a mark with pencil after the last word read to indicate how far they had read.

Then have them turn the blanks over immediately and write on the back all that they remember having read. Allow as much time as they need, but make sure that they do not copy from each other, or turn the blank over to see the text. Finally, have them fill out the spaces at the bottom of the blank.

N. B.—Make sure of allowing exactly 30 seconds for the reading. See that they all start and stop at the same time.

The pronunciation could be tested by having the pupil read the passage aloud after the test for speed and comprehension

have been completed, and by noting the number of words pronounced incorrectly. This test would have to be made individually and out of reach of hearing of the rest of the pupils.

Scoring of the Results.—The speed of reading is determined by ascertaining the number of words read per second. This can be done very rapidly by having a blank on which is indicated the number of words to the end of each line. By this blank the total number of words read can be determined almost instantaneously. Dividing by thirty will give the speed of reading per second.

The comprehension is determined by counting the number of words written which correctly reproduce the thought. The written account is carefully read, and all words which either reproduce the ideas of the test passage incorrectly or add ideas not in the test passage or repeat ideas previously recorded are crossed out. The remaining words are counted and used as the index of comprehension. Various objections may be urged against this method of scoring, but these are believed not to be serious. They will be considered below.

A sample test follows to illustrate the method of scoring. It is the test of an eighth-grade girl with test No. 8. This pupil had read 142 words, or 3.7 words per second. She wrote 77 words, five of which were discarded. These are enclosed in parentheses in the following:

The years went on and Earnest grew to be a man. He was not so very well known in the valley as he was quiet (with know habits besides always) at night when his work was done, he went aside and watched the Great Stone Face. As he was industrious and kind and only indulged in this idle amusement the neighbors thought it all right. They did not know that the Great Stone Face became a teacher to him.

Critical Points Concerning the Reliability of the Tests.—First the time limit. Does reading for thirty seconds adequately test a person's reading capacity? The time limit of thirty seconds was chosen, first, because the necessary text for this interval could all be printed on a sheet of paper about the size of an ordinary page in a reader, and second, because a longer interval of time would increase very materially the labor of scoring the results. But irrespective of length of text or labor of scoring, the chief point is the reliability of the tests.

In order to determine whether thirty seconds is an adequate length of time, a test was made on seven persons (seniors and

graduates) with two longer passages, one requiring approximately two and one-half minutes to read and the other approximately five minutes. The shorter passage was "Home," by H. W. Grady, and the longer one was "A Palace in a Valley," by Dr. Samuel Johnson, both in Cyr's eighth reader, pages 135 and 139.

The results of this test, as set forth in the following table, show that the speed of reading is practically constant for all three passages:

	Selection No. 9.	Home.	Palace in a Valley.
1. Speed (words per second).....	6.1	6.1	6.9
Comprehension (words written).....	90	369	407
2. Speed.....	7.1	5.3	7.2
Comprehension.....	123	280	730
3. Speed.....	3.8	3.4	5.3
Comprehension.....	38	243	112
4. Speed.....	5.1	3.6	3.2
Comprehension.....	69	244	...
5. Speed.....	7.1	6.5	6.5
Comprehension.....	117	463	635
6. Speed.....	4.3	7.4	6.9
Comprehension.....	66	204	333
7. Speed.....	3.9	4.3	...
Comprehension.....	64	249	274
Averages—Speed.....	5.4	5.1	6.0
Comprehension.....	81	293	415

The average speed for all subjects in case of the thirty seconds test was 5.4 words per second, for the next longer passage 5.1 words per second, and for the longest passage 6.0 words per second. One or two of the subjects, for example, Nos. 3 and 6, read considerably more rapidly on some of the passages than on others, but this is usually offset by smaller retention. Hence so far as speed is concerned, the thirty-second interval is entirely adequate. As to comprehension, more is retained absolutely, but less relatively, from the longer selections. This, of course, was to be expected. In order to make a quantitative comparison, each person was given a rank for both speed and comprehension, as shown in the following table:

Subjects.	Selection No. 9.	Home.	Palace in a Valley.
1.....	3	2	2
2.....	1	3	1
3.....	7	7	6
4.....	4	6	7
5.....	2	1	3
6.....	5	4	4
7.....	6	5	5

A person's performance in one passage is practically the same as in any other. Any person's rank is very nearly the same in all three passages. The coefficient of correlation between the tests with selection No. 9 and "Home" is .75; between "Home" and "Palace in a Valley" .82, and between No. 9 and "Palace in a Valley" .75.

These results indicate pretty definitely that the interval of thirty seconds is sufficiently long to give a very adequate test of a person's reading capacity both in regard to speed and comprehension of reading.

A second critical point is the increasing difficulty of the test passages. The eight selections were chosen from graded readers according to the best judgment. The problem, nevertheless, remains whether the successive selections increase by equal or nearly equal steps. This point is not especially important, since the growth in reading capacity from grade to grade can be measured by the method already described, namely, of testing each grade with its own sample and also with the sample of the grade just below it, and if desired, also with the sample of the grade just above it. However, it is interesting to ascertain the increase in difficulty, since uniformity is at least desirable, if not necessary. The data for this comparison are available from the tests already made. The speed and comprehension for all selections were computed from the tests of 1414 pupils and plotted in the curves in Fig. 1. An average curve, giving equal weight to speed and comprehension, is drawn between the two. The increases in either the speed or the comprehension are irregular in two or three places, but a rapid increase in one is, as a rule, counterbalanced by a smaller increase in the other. Thus selection No. 4 has a rapid gain in speed over No. 3, but no gain in comprehension. The same is true for No. 6. The resulting average is a smooth curve rising at a fairly uniform rate. This would indicate that the steps are fairly uniform in difficulty. In the original set of tests passages No. 9 was used in place of No. 8, but it was found to be relatively too difficult. The speed was 3.3 words per second and the comprehension 28 words on the average. This was less than the records for No. 7. The selection was then replaced by the present No. 8.

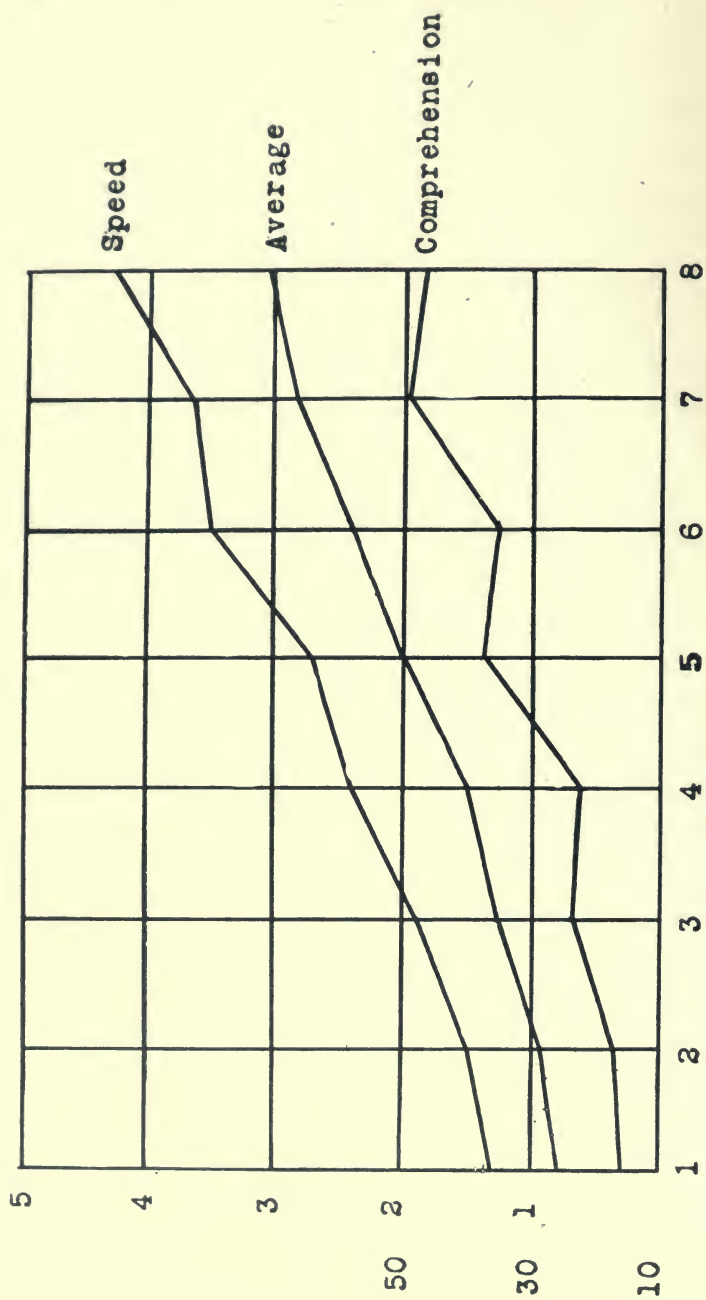


FIGURE 1. The numbers 1 to 8 along the baseline represent the eight test passages.

Objection to some of the passages might be taken on the ground that they are more or less familiar fables or pieces of literature. But the curves in Fig. 1 give no indication that selection No. 5 about King Midas was read more rapidly or retained more fully than its position demands. There is every indication on the basis of the tests made thus far that the familiarity gained in the ordinary reading in school with any passage will not appreciably affect the tests unless the reading has been done very recently, say within a month preceding the test.

A third point which must be considered in relation to the validity of the tests is the written reproduction of the thought as an index of comprehension. Some pupils may be able to express themselves more readily in writing and others more readily in speaking. Ideally, the comprehension should perhaps be tested by having each pupil state orally in his own words what he had read and by having a stenographic report of his statements. This method would entail much difficulty and require an enormous amount of time, as each child would have to be tested individually, and in the end it might be only slightly, if any, better, as an index of comprehension. The total amount reproduced might be somewhat greater, but it would be no more accurate. A child with a good verbal memory would have the same advantage in either oral or written reproduction. The reproduction in writing is uniform for all pupils. If there is a handicap it would be the same for all. The pupil who is at a distinct disadvantage in writing as compared with speaking is either very rare or fictitious. The pupils in the first grade, and perhaps also to a slight extent the pupils in the second grade, are at some disadvantage in the comprehension scores because of their greater difficulty in writing. This, however, would affect only their comparison with the grades above them and not the relative rank of the pupils within the grade itself.

Further, it might be urged that a fairer test of comprehension would be the reproduction of the thought after a longer interval of time, say a day, instead of immediately. In answer to this we may point out that the conditions of the test would be less uniform, and that the memory factor would be much

more prominent. Some pupils might purposely recall the contents of the selection at various times of the day in order to show up extra well in the results. Immediate reproduction imposes uniformity. Furthermore, recent investigations show a rather high correlation between immediate memory and permanent memory. So that a pupil with a good memory for immediate retention has also a good memory for permanent retention. And so far as the immediate memory span of verbatim reproduction is concerned, the limit of the span is far exceeded in the length of the passages. The immediate span of an adult for words in sentences is approximately 25 words, and that of a child of six about 12 words. This limit is far surpassed in the reading continued for 30 seconds during which the average eight-grade pupil reads 120 words and the average first-grade pupil reads 45 words.

In order to determine from a different angle the validity of these reading tests, a comparison was made between the efficiency in reading as shown by the tests and the efficiency as indicated by the marks in reading assigned by the teachers. This comparison was made in an entire school of 256 pupils. A coefficient of correlation between the results of the tests made at the end of the school year and the marks assigned by the teachers for the year's work in reading was computed for each grade separately, as shown in the following table. The marks in grades one and two were only rough symbols, and hence were not included here. The test in grade seven was not satisfactory, and so is also omitted.

Each pupil was given a rank for both speed and comprehension and also a rank based on the teachers' marks. The coefficients of correlation were then computed from these ranks.³

Third grade.....	.83
Fourth grade.....	.47
Fifth grade.....	.55
Sixth grade.....	.48
Eighth grade.....	.56
Average.....	.58

These coefficients show a rather high correlation between the tests and the reading as estimated by the teachers, particularly when we realize the inaccuracy of marks. There is every rea-

³These calculations were made by Mr. W. F. Roecker.

son for believing that the real reading capacity of a child is measured fairly accurately by means of these tests, and far more accurately than by the most conscientious marking. A still higher degree of accuracy would be reached if the tests were made at least four times instead of twice, as in the present instance.

Another possible method of testing comprehension would consist in answering selected questions upon the test passages. This method was tried with a group of nineteen pupils using blanks No. 7 and 8. A set of ten questions on each passage was presented to the pupils, who were to answer as many as they could in the allotted time, which was the period required for the quickest pupil to finish. The pupils had the passages before them, and were permitted to consult them freely while answering the questions. The same group of pupils had previously been tested by the other method, and a comparison showed that the question-answer method was less accurate as well as more difficult to score. It requires longer time to score a paper and involves the difficulty as to the value to assign to each answer.

A fourth point regarding the validity of the tests relates to the method of scoring comprehension, namely, of counting the number of written words which correctly express the thought of the test passage. This method was adopted because it is simple, rapid and objective. Two other possible methods might be used. One would consist in ascertaining the number of ideas correctly retained and the other would consist simply in assigning a percentile mark. The latter method has the fatal weakness of being so largely subjective. The former would be ideally the most appropriate method, but it encounters the problem of determining what an idea is and how many ideas there are in each test passage or in each sentence. Thus, if we take the first sentence in selection No. 3 and try to divide the words so that each word or group of words shall relate to one idea, we would have a rather difficult task, and different judges would make very different groupings. For example, is "little" a separate idea, or should "little Abe" be regarded as one idea, or again, is "hurried" a separate idea, or should "hur-

ried along" be considered as one. All these difficulties are avoided in the word-counting method here used.

In order to obtain a check test on the validity of this method of scoring, ten test papers obtained from ten eighth-grade pupils with selection No. 8 were graded for quantity and quality of thought by the percentile method by ten teachers. At the same time the ten tests were scored by the word-counting method. The comparisons can be seen in the following table:

Test papers.	Av. per cent. mark by 10 teachers.	Mean variation.	No. of words.	No. of words discarded.
1.....	90.7	4.9	86	7
2.....	86.0	3.2	75	0
3.....	80.2	3.2	61	0
4.....	80.0	3.0	71	5
5.....	78.2	5.5	66	0
6.....	75.0	7.0	47	0
7.....	71.3	9.3	49	0
8.....	64.4	6.8	46	0
9.....	63.7	8.7	42	0
10.....	52.2	8.6	33	0

The word-counting method coincides almost exactly with the average percentile mark assigned by ten teachers. The coefficient of correlation is .95. Hence the method of scoring here adopted is at least as reliable as the combined judgment of ten competent persons and has the very great advantage of rapidity, which is an exceedingly important item in administering the tests on a large scale.

Standards of Efficiency in Reading. In every branch of instruction in the public schools we need a definite standard of attainment to be reached at the end of each grade. If we had such standards and if we had adequate means of precisely measuring efficiency, it would be possible for a qualified person to go into a schoolroom and measure the attainment in any or all subjects and determine on the basis of his measurements whether the pupils are up to the standard, whether they are deficient, how much, and in what specific respects.

The reading tests just described have been made thus far on 3511 pupils in 15 schools in seven cities located in three States, Wisconsin, Minnesota and New York. The tests were administered and scored according to the conditions outlined. On the basis of these results tentative standard scores of efficiency

have been computed for each grade. These standards, presented in the tables and curves that follow, are not the arithmetical averages of the records obtained in each grade, but they are the smoothed values obtained from these averages. As a matter of fact, these smoothed values deviate only slightly from the actual averages. But it is believed that they approximate more nearly to universal standards that would be obtained from tests made in many schools in various cities. The present standard scores, while they must be regarded as tentative, probably do not differ very materially from final standards based on many more tests. As a matter of fact, the averages derived from the first 2000 pupils were not greatly changed by additional tests.

STANDARD SCORES IN READING.

(Smoothed values derived from tests made on 3511 pupils.)

Grades	1	2	3	4	5	6	7	8
Speed of reading (words per second) ..	1.5	1.8	2.1	2.4	2.8	3.2	3.6	4.0
Comprehension (words written)	15	20	24	28	33	38	45	50

The following table gives the scores made by each of the grades in the 15 schools tested. The averages given at the bottom of the table are not the actual arithmetical averages of the numbers given, because some of the schools were very much larger than others, and their scores were weighted accordingly, so that the averages represent the actual arithmetical averages

SPEED OF READING.

(Scores made in fifteen schools.)

Grades	1	2	3	4	5	6	7	8
City A, School 1.....	1.6	2.0	2.6	3.1	3.5	3.9	3.8	
School 2.....	1.5	...	...	...	...	3.9	...	
School 3.....	1.9	2.1	2.4	2.8	...	3.3	2.9	3.2
School 4.....	...	1.4	2.3	...	...	...	4.5	...
School 5.....	...	...	...	3.2	2.9	3.8	...	4.5
City B, School 1.....	...	1.6	2.1	2.4	3.0	3.7	3.8	4.0
City C, School 1.....	...	1.2	1.7	2.0	2.3	3.1	3.6	3.7
City D, School 1.....	1.0	1.9	2.5	2.5	2.5	2.9	2.9	3.2
City E, School 1.....	1.9	...	...	2.7	...	1.9	...	3.5
School 2.....	2.1	...	...	2.2	2.8	3.1	...	...
School 3.....	1.8	2.3	1.7	2.3	...	...	...	...
School 4.....	1.9	2.6	...	1.9	...	...	...	...
School 5.....	2.3	2.3	3.1	1.6	...	3.3	5.2	3.9
City F, School 1.....	1.2	1.6	2.0	2.6	3.0	3.3	3.2	4.1
City G, School 1.....	1.0	1.8	1.3	2.0	2.0	2.7	3.1	4.1
Averages.....	1.6	1.9	2.1	2.4	2.7	3.2	3.7	3.8

COMPREHENSION OF READING.
(Scores made in fifteen schools.)

Grades	1	2	3	4	5	6	7	8
City A, School 1.	17.4	16.9	22.2	31.6	37.0	40.3	46.3	50.7
School 2.		27.9	....	....	....	....	53.5	....
School 3.	17.4	24.6	31.7	33.8	....	35.7	35.3	40.6
School 4.		28.1	41.6	....	....	....	54.2	....
School 5. . . . .		....	....	35.3	47.3	48.3	....	50.8
City B, School 1.		18.5	21.5	24.6	29.4	37.2	49.6	56.4
City C, School 1.		13.8	19.2	22.8	29.1	38.2	50.2	57.0
City D, School 1.	16.8	20.0	38.2	26.4	32.0	35.2	36.6	45.2
City E, School 1. . . . .		....	....	35.7	....	28.8	....	44.5
School 2. . . . .		....	....	17.6	33.8	38.2	....	....
School 3.		21.6	25.4	25.7	....	....	....	....
School 4.		21.2	....	23.8	....	....	....	....
School 5.	17.5	20.4	24.3	23.3	....	43.3	51.3	36.9
City F, School 1.		21.6	21.9	21.4	33.0	32.6	36.4	53.3
City G, School 1.	6.5	15.6	21.8	16.0	28.1	36.7	44.7	55.1
Averages.	13.8	20.9	26.9	25.2	33.7	37.7	46.0	49.1

of the total number of pupils. All the tests were made at the end of the school year, with the exception of three schools, which were tested in January. Their scores were weighted so as to represent the estimated values that would be attained at the end of the school year. This was necessary in order to obtain final averages which would represent the achievement attained at the end of each grade.

The degree of efficiency can be represented most simply either by curves drawn, as in Figs. 2 and 3, or by graph charts, as in Figs. 4 and 5. The vertical columns in these charts represent the eight grades. The two horizontal lines are the standard scales for speed and comprehension. The division points on each scale are so placed that the middle point for any column represents the standard for that grade, as shown in the table of standard scores. Thus the graph of a pupil in the third grade who is exactly up to the standard in every respect would be a straight line down the middle of the third column.

By means of the standard curves it is possible to measure quite accurately the actual attainment in reading of individual pupils, of an entire grade, of an entire school, or of a whole school system. Fig. 4 shows the comparison of an elementary school of 401 pupils in a city of 40,000 population with the standards. Fig. 5 gives the results of a test in a small city of about 2000 population. There is considerable deficiency in nearly all grades in the latter city, which is probably due to the

large foreign element. Some of the pupils wrote their tests in a foreign language.

Individual Differences and the Overlapping of Grades.—One of the most important, if not the most important, discovery of the recent measurements of efficiency in school studies is the enormous range of differences in capacity shown by the pupils in the same class or grade. There is a tacit feeling that when a pupil is promoted to the next higher grade his capacity is distinctly superior to the average ability of the pupils left behind, and that the pupils of any given grade, while not alike, are individually and collectively superior to the average or even to the better ones of the next lower grade.

It is, therefore, most surprising to find that the abilities shown by the pupils of any grade, with the possible exception of the first and second, are distributed over the entire scale. For example, there are pupils in the fourth grade whose attainment in reading is higher than that of the average eighth-grade pupil. Likewise there are pupils in the fourth grade whose attainment in reading is inferior to that of the average first-grade pupil.

To show these facts concretely, the distributions of the reading abilities of the pupils in the fourth and fifth grades of city 1, school 1, are shown in the charts of Fig. 6. Each pupil is represented by a dot which is placed above the base line, so that it will indicate the pupil's capacity. For example, there is one pupil in the fourth grade whose speed of reading is 2.0 words per second, there are two pupils whose speed of reading is 2.1 words per second, etc. The first chart at the top shows the distribution of the pupils in speed of reading, the middle chart shows the distribution of the same pupils in comprehension, and the one at the bottom shows the distribution of these pupils in speed and comprehension combined. In this third chart speed and comprehension are arbitrarily given equal weight and a single score is assigned to each child. The two elements are combined so as to avoid the possible objection that might be made to the effect that pupils might differ very much in speed or in comprehension separately, and that the pupil who reads rapidly might comprehend little, and vice versa, and that if due weight were given to both elements the final capacities

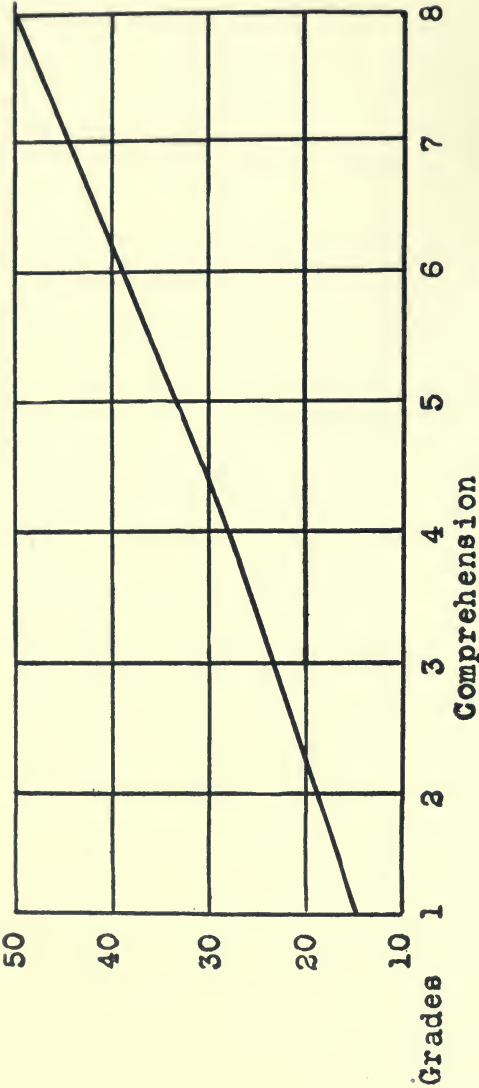


FIGURE 2.

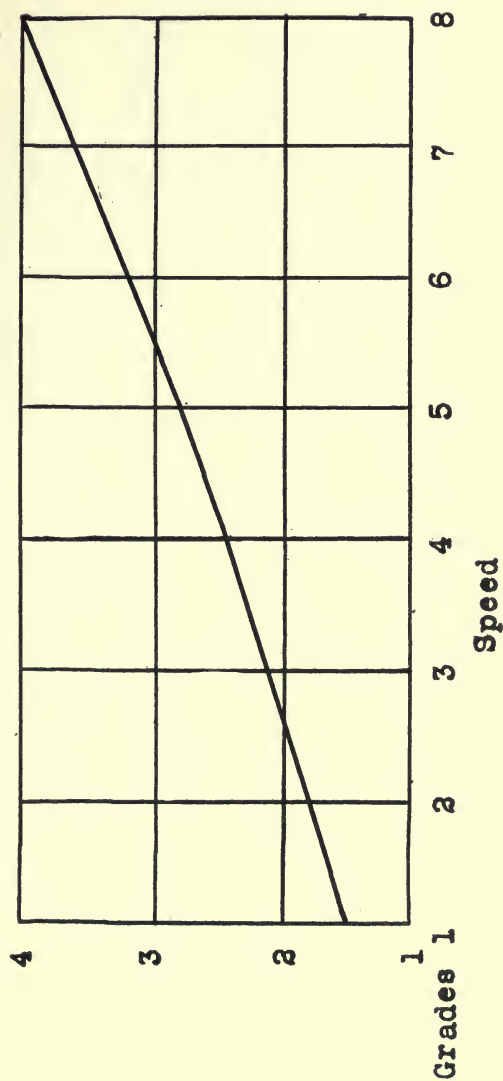


FIGURE 3.

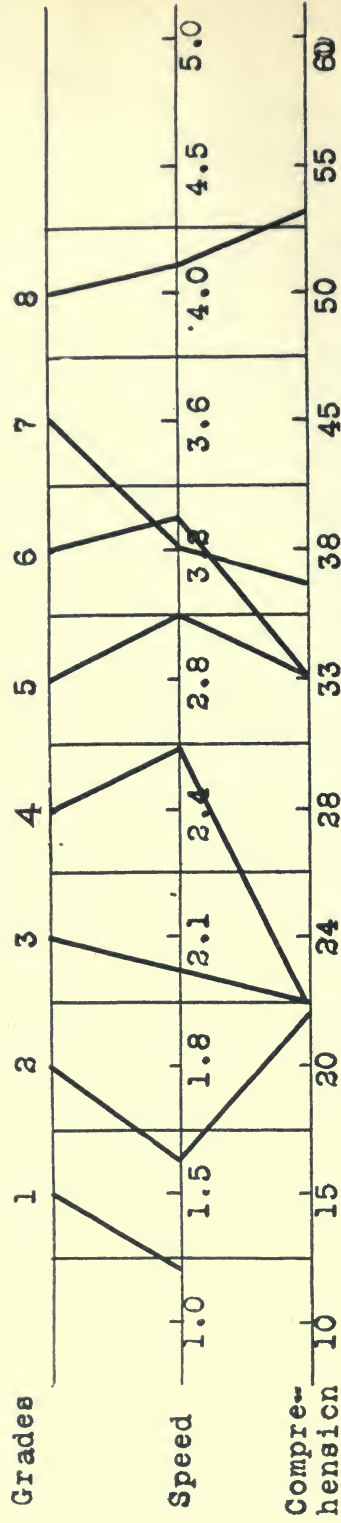


Figure 4. Tests in City F.

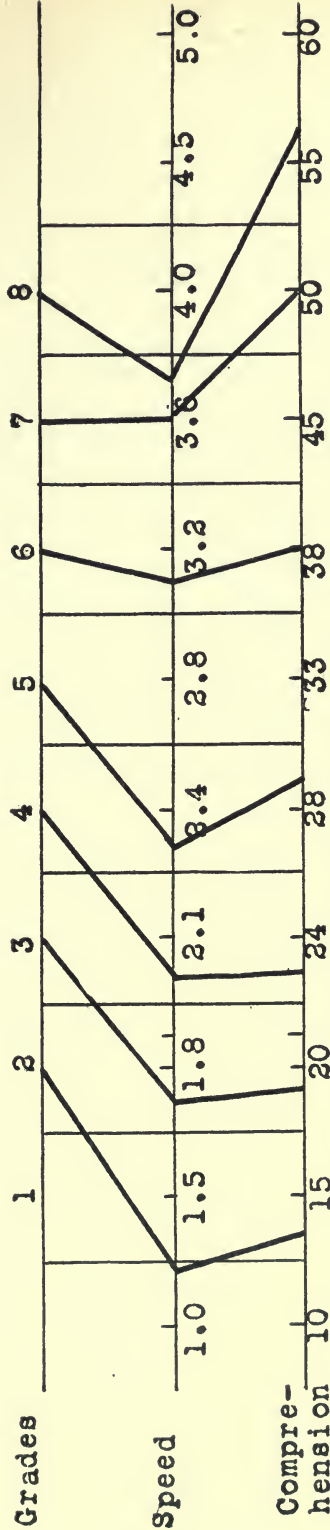


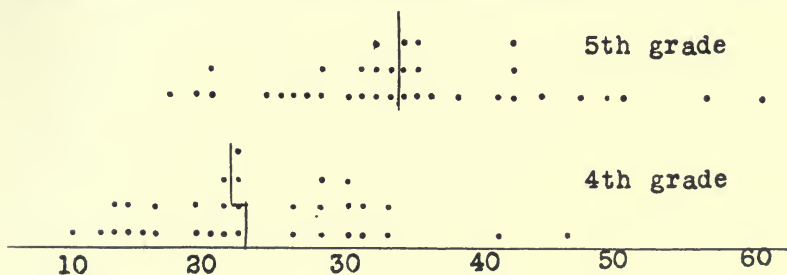
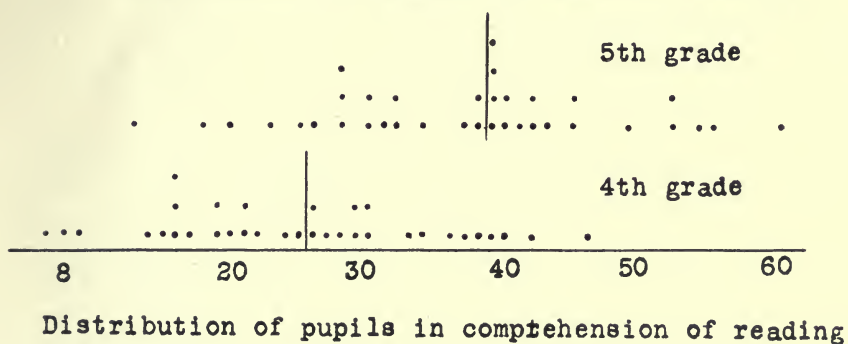
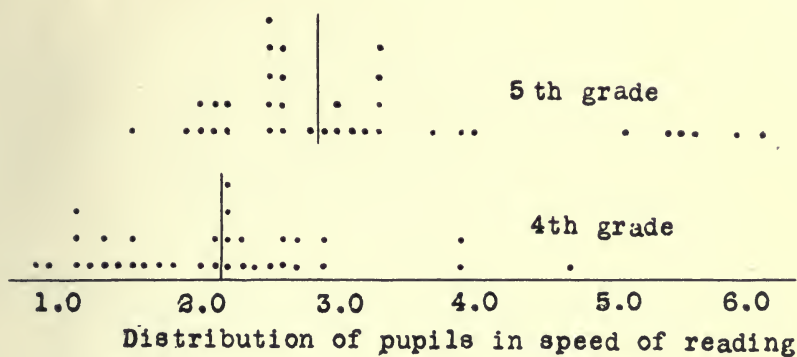
Figure 5 . Tests in City C.

might not differ nearly so much. Now, it will be seen at a glance that the ranges of difference in either speed or comprehension or in both combined are astoundingly wide, and that they are practically the same for either element or for both together.

Thus in the fourth grade there is one pupil whose speed of reading is .8 words per second and one whose speed is 4.7 words per second. The standard score for speed in the first grade is 1.5 words per second, and in the eighth grade 4.0 words per second. The one falls considerably below the standard of the first grade and the other rises considerably above the standard of the eighth grade.

In comprehension, the same statement holds. There is one pupil in the fourth grade whose score is seven words and one whose score is 46 words. The standard score for the first grade is 15 words and for the eighth grade 50 words. In the chart which combines speed and comprehension, the best pupil in the fourth grade made a score four and one-half times as high as the poorest. Surely such differences among pupils in the same grade are startling.

The next significant fact which necessarily accompanies the wide differences in attainment is the large amount of overlapping of the abilities in one grade with those of the next. A concrete example of the extent of the overlapping is exhibited in the charts of Fig. 6, in which the fourth and fifth grades are placed above each other on the same base line, so that a direct comparison can be made. The median is indicated in each chart by the vertical line. Thus in speed of reading there are only six out of 36 pupils in the fifth grade who are superior to the best pupil in the fourth grade, and only 9 out of the 34 pupils in the fourth grade who are inferior to the poorest in the fifth grade. In comprehension, there are likewise only six pupils in the fifth grade who are superior to the best in the fourth grade and only three pupils in the fourth grade who are inferior to the poorest in the fifth grade. Expressing these facts in another form, we may say that, in speed, 80 per cent. of the pupils in the fifth grade fall below the best in the fourth grade, and 74 per cent. of the pupils in the fourth grade reach or surpass the poorest in the fifth grade. Taking both speed



Distribution of pupils in speed and comprehension

The vertical lines show the location of the medians

and comprehension together (lower chart in Fig. 6), exactly 80 per cent. of the pupils of either grade (89 per cent. of the fifth and 71 per cent. of the fourth) fall within the range of the other grade. Or, exactly 60 per cent. of the pupils of either grade could be replaced by an equal number from the other grade without affecting in the slightest the reading efficiency of either class. The difference between 80 per cent. and 60 per cent. is due to the fact that if 80 per cent. of the pupils in the fourth grade were transposed into the fifth grade there would be a larger proportion of poor pupils in the fifth grade than is found there at present. Likewise if 80 per cent. of the pupils in the fifth grade were transposed into the fourth grade there would be a larger proportion of good pupils in the fourth grade than is found there at present. If as many pupils of one grade, who have the same ability as an equal number of pupils in the other grade, were to be transplanted, then the percentage reduces itself to 60.

A study similar to that shown in Fig. 6 was made of all the grades in three schools, each in a different city. The results were identical in every respect with those shown in Fig. 6. The range of differences and the overlapping was just as large. In addition it was found that, in speed and comprehension combined, 31.8 per cent. of the pupils of any grade reached or exceeded the median of the next grade above, 20.1 per cent. reached or exceeded the median of the second grade above, 13.2 per cent. reached or exceeded the median of the third grade above, and 3.3 per cent. reached or exceeded the median of the fourth grade above. In other words, one-third of the pupils of any given grade could do the reading work of the next grade above as well as the average of that grade, one-fifth could do the work of the second grade above it as well as the average of that grade, and one-eighth could do the work of the third grade above it as well as the average of that grade. Likewise, corresponding percentages of pupils in any given grade are no more efficient in reading than the average of one, two or three grades below it.

Should these differences be taken into account in our schools? Should the pupils be reclassified into higher or lower classes according to their capacities? The facts presented here reveal the situation as it actually exists at the present time.

A SCALE FOR MEASURING FREE-HAND LETTERING.

HAROLD ORDWAY RUGG,
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I. PRINCIPLES AND METHOD OF ITS DESIGN.

In March, 1914, as a result of some two years' research, the writer submitted for the consideration of students of education and teachers of engineering lettering, a Scale for Measuring Free-hand Lettering. The aim of the entire study in this field has been (a) to design a scale for the measurement of free-hand lettering which can be efficiently used by teachers and students of engineering drawing, both in secondary and higher technical schools; (b) to so further the standardization of the teaching process in engineering lettering that practically all students might be enabled to develop all necessary skill through such incidental training in lettering as can ordinarily be given in the usual course in mechanical drawing. The opportunity is now presented of stating briefly the principles of design of such a scale, together with a preliminary critique of its use by teachers and students in the classroom.

The Function and Necessary Criteria of a Scale in Lettering.

1. The scale should be designed to be a definite classroom aid to both teachers and students of lettering in higher and secondary technical schools.

2. It should aid the instructor by enabling him (a) definitely to evaluate samples of student lettering and to assign them numerical grades; (b) to judge of the rapidity of a student's progress as compared with that of an average class using the Standard Method; (c) to solve more easily the daily difficulties encountered by his students; (d) to foresee the pitfalls in the development of skill in lettering by students of varying grades of ability and to devise methods of avoiding

them; (e) to know the effect of the "time" element on the development of skill of various types of students.

3. The scale should aid the student by enabling him numerically to grade his own lettering product; to compare his rate of progress with that of a normal class having the same previous training; more accurately to detect his errors in technique; to know the most efficient rate of speed to follow at various periods throughout the semester.

4. To accomplish these aims, any efficient scale must fulfill the following conditions: (a) It must be a numerical measure; (b) it should be based on an absolute system of marking alike for all samples used; (c) it should be made up of samples obtained under normal classroom conditions using the method suggested; (d) the samples should be arranged by equal intervals for the entire range of ability found in a normal class; (e) it should be easy to use and adaptable to any secondary or college class in mechanical drawing.

How This Scale Was Designed.

A. The Form or "Copy."

To obtain representative samples of student lettering a standard form or "copy" was required based on the principle that the frequency of letters in the form should be in proportion to (a) the relative difficulty of execution of the letters of the alphabet, (b) the frequency of their occurrence on representative engineering drawings. (For a complete description of the design of the form see the original descriptive pamphlet and Scale. These may be secured on request from the writer.) Since the data based on the principle of "letter difficulty" were not at hand, the design of the form was based on the principle of frequency of occurrence of letters on engineering drawings.

B. Securing the Samples for the Scale.

The form mentioned was designed and adopted for use in 1913 in all the sections of the Department of General Engineering Drawing, University of Illinois. Beginning with the second day of the first week's work in drawing, the writer conducted a daily lettering drill throughout the semester of 15 weeks. This class drill consisted of three lines of the Standard

Form, the elapsed time being announced by the instructor and recorded by the student. During the first four weeks the drill was preceded by discussions with each student of errors, best methods of procedure, etc. Faults (which are known from previous experimentation to appear at certain intervals) were pointed out and emphasized through brief blackboard talks to the class. After the first four weeks the personal talks with individual students were generally discontinued and brief general directions given to the class. Each student was always asked to do his best work regardless of the speed of his neighbor. In general this result was obtained and there has been evinced a very high degree of interest on the part of the student in a sort of technique which is generally considered to be tedious and devoid of interest to the student and teacher alike.

C. Scoring and Selection of Samples for the Scale.

Various methods of scoring have been studied and laboriously experimented with by the writer during the past year. The method finally adopted, with the underlying principles, may be analyzed thus:

1. The fundamental aim in lettering is to teach students "to make neat letters quickly."
2. Neatness in lettering may be taken as synonymous with "of good appearance."
3. Good appearance is believed to depend primarily upon "uniformity" in the construction of each individual letter and the combination of various letters into words.
4. All Reinhardt lettering may be analyzed into its four component elements, viz., heights of letters, spaces (both between letters and between words); stems (vertical, horizontal and slant), and ovals.
5. Uniformity of lettering is a composite of uniformity of heights of letters, spaces between letters and words, stems and ovals, and may be expressed algebraically as follows: $A = H \times k_1 + Sp \times k_2 + St \times k_3 + Ov \times k_4$, in which A equals the ability to letter as shown by a given sample, and H, Sp, St and Ov are percentages of heights, spaces, stems and ovals, respectively, found to be correct in the whole form, and where the k's are constants depending upon the weights to be given to the

various elements in lettering, k_1 for heights, k_2 for spaces, k_3 for stems, and k_4 for ovals.

6. The numerical value to be given the constants k were finally fixed in the following manner: Various words in the form were lettered by the writer, certain types of errors being purposely made. Comparison of results made it apparent that lack of uniformity in heights and spaces had a larger effect on the "good appearance" of the lettering than lack of uniformity in the construction of stems and ovals. Further to test this point, a preliminary grading was made of the samples obtained in the first week, assigning various values to the k 's for each of the four elements. Making all the values of k equal to .25 tends to undergrade the samples from the point of view of "good appearance." It was believed by the writer that making k_1 and k_2 .30 and k_3 and k_4 .20 underestimated the true effect of heights and spaces. The following values of k were finally empirically assigned: k_1 and k_2 = .33; k_3 and k_4 = .17, and were used throughout the computation. Thus the fundamental criterion upon which these samples have been graded is that weight should be given to those elements in which the greatest proficiency occurs. And careful examination of the tabulated scores throughout the semester shows that a much larger proficiency was obtained in the determination of heights and spaces than in the construction of stems and ovals. In critical examination of the values assigned to each of the k 's it should be remembered that the difference in numerical grade obtained from the samples by using k_1 and k_2 = .33 and k_3 and k_4 = .17 is on the average less than 2 per cent. higher than that obtained by using k_1 and k_2 = .30 and k_3 and k_4 = .20, and only 3 per cent. higher than that obtained by weighting all elements alike, *i. e.*, in making all the k 's = .25.

7. The determination of the method of scoring the samples and the final values of "A" was the result of laborious experimentation and computation in the grading of samples, carried out as follows: Two methods were used: 1. The method of "general impression" of uniformity. 2. The method of counting specifically the number of correct heights, spaces, stems and ovals in each of the samples, with the accompanying computation of the final grade of each sample by the use of the

above equation. By the first method the samples of the first week's work were arranged in order of general merit as determined by the "general impression" of good appearance. This ranking in order was carried through independently three times, the final ranking of each sample being determined by the closest approximation to the mean position of the ranking.

By the second method the total number of single operations in the three-line form was counted, these totals being, heights (letters), 176; spaces (both between letters and words), 167; stems, 173; ovals, 181. The percentage of correct number of heights, spaces, stems and ovals was next computed, tabulated and the resultant grade or ability "A" as shown in each sample was computed from the above equation. The order of the samples as ranked by this method was then compared with the order obtained by the method of "general impression." Nine of the first 10 samples occupied the same position in both orderings. The first 20 as scored by "impression" included 16 as scored by "counting"; the first 30 as scored by "impression" included 26 as scored by "counting." Careful examination of the two rankings showed that in general the arrangement of the samples by the two methods was very nearly identical.

Whereas the first method of grading gives only a qualitative ranking of samples and offers no indication of the quantitative interval between any two samples, and the second method, while ranking in the same general order, also gives a definite numerical grade to each sample, it was decided to score all samples throughout the semester by the "counting" method. The samples for the entire semester (1500 in all) were then scored by the writer by this detailed method. The number of single operations on each sample being separately counted and tabulated, the per cent. of correct strokes were computed and used in the efficiency equation by introducing the proper coefficients. Thus the scoring and selection of samples for this Lettering Scale has involved the counting and judging of the accuracy of something over 100,000 single strokes, with the necessary accompanying tabulation and computation.

8. The next and final step in the construction of the Scale was the selection of the specific samples which should go into its makeup, they being so selected that the interval between

any two consecutive steps should be constant, and the total range being taken as the numerical distance between the model copy and the lowest graded sample (98-29.8 per cent.) All samples whose grades fell between any of the intervals, 89.5-90.5; 79.5-80.5; 69.5-70.5; 59.5-60.5; 49.5-50.5; 39.5-40.5; 29.5-30.5; were next selected and arranged in separate groups, each group being arranged by "impression" in order of general merit. The most representative sample in each group was then selected to occupy a position on the Scale corresponding to the grade of that group. This results in a Scale of eight samples, ranging by intervals of approximately 10 per cent. each, from 100 per cent. to 30 per cent. It is believed that the samples selected are typical of their group, and that the intervals on the Scale as thus determined are for all practical purposes equal. The complete Scale reproduced herewith is a full-sized reproduction of these samples as originally mounted in the order of their excellence.

Outline of the Method of Using the Scale in Teaching Free-Hand Lettering.

The development of the ability in students to make "neat letters quickly" (our fundamental aim) involves a teaching process including at least the five following steps: 1. The exposition of the necessary facts and principles. 2. Creation of right attitudes on the part of the student. 3. The presentation of the necessary "mechanics of method." 4. Establishment of right habits of thought. 5. The building up of specific habits of finger and wrist technique. It is to the carrying out of the last of these steps that the administration of our Scale can contribute. An outline of the method of its use in the classroom follows:

A daily lettering drill (8 to 15 minutes in length) is held about the middle of the drawing period throughout the semester of 15 weeks, procedure being as follows:

1. After short general class directions as to specific elements of lettering to which various members of the class should be paying the most attention and caution as to the amount of time used, the entire class, beginning work at the same time,

letters a three-line block of the Standard Form. As each student completes his block the instructor states the elapsed time (in minutes and seconds), this result being lettered by the student in the proper place on the form.

2. The student then turns to his Scale (each student has one of his own), and compares his sample with those of the Scale, moving both up and down the sheet and grading twice, finally assigning the sample a numerical grade.

3. The instructor carefully checks the grading of each student's samples, suggesting revision of grade where necessary, with such thorough explanations as to enable the student to train his own judgment through future practice.

4. The student plots his grade and time on the proper ordinate of the Practice Curve cross-section (page 4 of the Scale), and compares critically the shape of his curve to date with that of the practice curve of the "average" class shown on page 3 of the Scale. It has been found to expedite matters to have all grading and plotting done once a week at the third exercise.

II. PRELIMINARY CRITIQUE OF THE LETTERING SCALE.

In September, 1914, the Department of General Engineering Drawing of the University of Illinois adopted for trial during the current year both the Lettering Scale and the complete method outlined for its use. It has been used daily by six instructors and 300 students, and is also being experimented with in six other institutions. After eight weeks of classroom use by both teacher and student we are now in a position to report briefly a preliminary critique of the efficiency and practicability of the Scale itself. To do so in the brief space allotted to this article, it will be possible to publish only the statistical summary of results. (All of the original data concerning the design of the Scale and its critical application in the classroom are on file at the University of Illinois and may be inspected by those interested.)

We submit below: 1. Data showing the efficiency with which beginning students (never having seen the Scale and having had no training in engineering lettering) were able to arrange in order of merit the samples of the Scale. Table 1 presents

A SCALE FOR MEASURING FREE HAND LETTERING

FOR TECHNICAL COLLEGES AND SECONDARY SCHOOLS

HAROLD ORDWAY RUGG, C.E.

Efficiency in Lettering—Practice Daily Letters Most Frequently Used

Material Finished Cast Steel	Section Gear Parts Keyways	Shaft Bearing
Required Name Number View	Drill Holes Mast Studs Cover	Bronze Pipes
Dimension All Detail Drawings	Taper Joint Lock Nuts Mixer	1234567890

Material Finished Cast Steel	Section Gear Parts Keyways	Shaft Bearing
Required Name Number View	Drill Holes Mast Studs Cover	Bronze Pipes
Dimension All Detail Drawings	Taper Joint Lock Nuts Mixer	1234567890

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Material Finished Cast Steel	Section Gear Parts Keyways	Shaft Bearing
Required Name Number View	Drill Holes Mast Studs Cover	Bronze Pipes
Dimension All Detail Drawings	Taper Joint Lock Nuts Mixer	1234567890

the tabulated results as submitted by each of seventy-four students, typical tendencies being indicated by the summary. 2. Data showing relative efficiency of students and instructors in grading samples of student lettering, some without the Scale and some with the Scale. Table 2 presents the data, itemized as follows:

A. The average grade given by seven instructors and thirty-eight students, to twenty samples of lettering done by students in the writer's classes, samples so selected as to give approximately an equal distribution above and below 75 per cent. This average grade is regarded as the "true grade."

B. The mean variation from the True Grade of the grades assigned to each of the twenty samples by (1) the seven instructors of the department; (2) sixteen students in one of the writer's classes; (3) twenty-two students in one of Mr. F. M. Porter's classes. All students and instructors had used the Scale in the classroom during eight weeks.

C. The mean variation from the True Grade assigned to each of twenty samples by (1) the seven instructors of the department previous to having used the Scale in grading samples of student work, their basis of marking being that of the previous practice in the department as interpreted by the individual men; (2) twenty-two students of one of the writer's classes, trained in the use of the Scale (to the extent of not more than fifteen minutes' practice per week for eight weeks). In this case the grading of samples was without the use of the Scale, the students being asked to grade the sample in accordance with their memory of the quality of work represented by each of the samples on the Scale; (3) sixteen students in another of the writer's classes, all freshmen engineers, previously trained in drawing and lettering, but never having seen the Scale. This group was asked to grade according to their own best judgment, a brief explanation being written on the blackboard of the nature of the four essential elements of lettering and the way in which uniformity of sample was to be considered as fundamental in marking. All the grading above mentioned was done under the supervision of the writer.

3. Data giving (a) the practice curves (quality and time) of thirty-one students in the writer's classes during the first

semester, 1913-14, using the system of teaching at that time developed, but not having access to a Lettering Scale for measuring progress. (b) Similar practice curves (quality and time) of thirty-seven students in the writer's classes during the first seven weeks of the current semester, using the improved system and the Lettering Scale.

The results of several weeks' critical study of student work and our statistical data, coupled with the very helpful criticism of three members of the drawing department, enable us to comment as follows on results of using the Lettering Scale.

A. Efficiency With Which Beginning Students Arranged the Samples of the Scale in Order of Excellence.

From a study of Table 1, giving the number of students arranging the samples in order with no mistakes, one mistake, two mistakes, etc., and the number of steps which the various samples were arranged out of place by various students, we can conclude as follows: 1. The upper and lower samples on the Scale are separated by such distinct intervals as to be correctly recognized by practically all untrained students. Samples 80, 70, 60 and 50 are separated by such intervals as to be correctly recognized by two-thirds of any group of such untrained students. In the case of these samples the proportion of the students misplacing each sample by one step is for the 80 per cent. sample, one-third; for the 70 per cent. sample, one-fifth; for the 60 per cent. sample, one-third; for the 50 per cent. sample, two-fifths. Questioning the students brings out the fact that in the case of practically all, the sample misplaced was always so placed after considerable debate over the question (1) of the relative emphasis to give to different elements in the sample; (2) of extraneous elements, neatness, heaviness of line, peculiar style of stroke, etc. This latter element was considered in detail by the writer in designing the Scale, and the attempt was made in selecting the specific samples for the Scale to take only those samples which not only "counted right," but which would also emphasize some distinctive quality as we proceed up the Scale. It is clear that this was successful to the extent of being recognized by all of the students at the upper

TABLE 1.

The order in which 74 beginning students arranged the 8 samples of the Lettering Scale.

No. of student.....	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
Samples:																									
100%	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
90%	2	2	2	2	2	2	2	2	2	3	3	4	2	2	2	2	2	2	4	2	2	2	2	2	
80%	3	3	3	3	3	3	3	3	3	2	2	3	4	3	3	4	4	3	3	3	3	3	3	3	
70%	4	4	4	4	4	4	4	4	4	4	4	2	3	4	4	3	3	4	2	4	4	4	4	4	
60%	5	5	5	6	5	6	6	6	6	6	5	6	6	5	5	5	6	5	5	5	6	5	6	5	
50%	6	6	6	5	6	5	5	5	5	5	6	5	5	6	6	6	5	6	6	6	5	6	5	6	
40%	7	7	7	7	7	7	8	7	7	7	8	7	7	7	7	7	7	7	7	7	7	7	8	7	
30%	8	8	8	8	8	8	7	8	8	8	7	8	8	8	8	8	8	8	8	8	8	8	8	7	
None interchanged.....	x	x	x	..	x	..	..	..	..	..	..	..	..	..	x	x	..	..	x	..	x	..	x	..
1 " .....	..	..	..	x	..	x	..	..	..	x	..	..	..	..	..	x	..	..	x	..	x	..	..	..
2 " .....	..	..	..	..	..	..	x	x	..	x	x	x	x	x	..	..	..	x	..	..	..	..	x	..
No. of student.....	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49
Samples:																									
100%	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
90%	2	2	2	2	2	2	2	2	2	2	3	2	2	2	2	3	2	2	2	2	2	3	2	2	
80%	4	3	3	3	3	3	3	3	3	3	2	3	4	3	4	2	3	3	4	4	3	2	3	3	
70%	3	4	4	4	4	4	4	4	4	4	5	4	5	4	3	4	4	4	3	5	4	4	4	4	
60%	6	6	6	6	5	5	6	6	5	5	4	5	3	6	6	5	5	5	5	3	5	5	5	5	
50%	5	5	5	5	6	6	5	5	6	7	6	6	6	5	5	6	6	6	6	6	6	6	6	7	
40%	8	7	7	7	7	8	7	7	7	6	7	7	7	7	7	7	7	7	7	7	7	7	7	6	
30%	7	8	8	8	8	7	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	
None interchanged..	..	..	..	..	x	..	..	..	x	..	..	x	..	..	..	..	x	x	..	..	x	..	x	..
1 " .....	..	..	x	x	x	..	x	x	x	..	x	..	..	..	x	..	x	..	..	x	..	..	x	x
2 " .....	..	..	..	..	..	..	..	..	..	..	x	..	..	..	x	..	..	..	..	..	..	..	..	..
3 " .....	..	x	..	..	..	..	..	..	..	..	..	..	x	..	..	..	..	..	..	..	..	..	..	..
No. of student.....	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74
Samples:																									
100%	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
90%	2	2	3	2	2	2	2	2	2	2	3	2	2	2	2	2	2	4	2	2	2	2	2	2	
80%	3	3	2	4	4	3	3	3	3	3	2	3	3	4	6	3	3	2	3	4	3	4	3	4	
70%	4	4	4	6	3	4	4	4	4	4	6	4	4	3	3	4	4	6	4	3	4	3	4	3	
60%	5	6	6	3	5	5	5	6	5	5	4	5	5	6	4	5	5	3	6	5	5	6	5	5	
50%	6	5	5	5	6	6	6	5	6	6	5	6	6	5	5	6	6	5	5	6	6	5	6	6	
40%	7	7	7	7	8	7	7	7	8	7	8	8	7	8	8	8	7	8	7	7	7	7	7	7	
30%	8	8	8	8	7	8	8	8	7	8	7	7	8	7	7	7	8	7	8	8	8	8	8	8	
None interchanged..	x	..	..	..	..	x	x	..	..	x	..	..	x	..	..	..	x	..	..	..	x	..	x	..
1 " .....	..	..	x	..	..	..	..	x	x	..	..	x	..	..	..	x	..	..	x	x	..	..	..	x
2 " .....	..	..	..	x	..	x	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	x	..	..
3 " .....	..	..	..	..	x	..	..	..	..	..	..	..	..	x	..	..	..	..	..	..	..	..	..	..
4 " .....	..	..	..	..	..	..	..	..	..	..	x	..	..	..	x	..	..	..	..	..	..	..	..	..
5 " .....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	x	..	..	..	..	..	..	..

and lower range and by two-thirds of them in the middle range. The one place error of the remaining one-third of the students at least raises the question whether the attempt should not be made to obtain samples which will score correctly for each position of the middle range and have at the same time a quality so distinctive of their position on the Scale that all untrained students would arrange them in precisely the right order. In the Slant Lettering Scale, upon which the writer is now working, this characteristic of distinctive "style" is being taken care of by making up three scales, all of whose samples score correctly, but at the same time giving three distinct "characters" in lettering, with each individual scale emphasizing a constant weight of line peculiar to it alone.

B. Results of Grading Twenty Samples of Student Lettering, With and Without the Scale.

Critical study of the above summary table and of the detailed data from which the main variations were obtained leads to the following conclusions:

1. The true grades on each of eight of the samples as expressed by average grades of forty-five judges lies above 75 per cent., and the true grades of twelve samples lies below 75 per cent.

2. The mean variations from true grade given to the samples by instructors and students when grading with the Scale run so closely together as to indicate that the limited training received, functioned to enable students to judge the quality of student lettering as efficiently as their instructors. Mean variations of all grading done by students is 5.92 per cent.; that of instructors, 5.31 per cent.

3. Samples of 50-60 per cent. quality can be judged as accurately with the aid of the Scale as those of a quality above 80-85 per cent.

4. When marking without the aid of the Scale and not having agreed upon a common standard, instructors show twice as much mean variation (10 per cent. to 5 per cent.) with samples grading below 75 per cent. as with those above 75 per cent. There is quite evident here the "high marking" personal equa-

TABLE 2.

Mean Variations (in Per Cent.) from the True Grade, of Grades Given by Instructors and Students.

	Ave.										Ave.									
	No.	7	2	10	18	12	of	3	19	73.1	M. V.	15	14	6	9	of				
No. sample.....	8	88.9	87.0	85.6	84.4	83.2	M. V.	77.0	73.1	M. V.										
True grade.....	89.3																			
7 instructors....	3.5	4.5	3.2	4.4	4.5	3.3	4.2	4.5	6.0	(5.3) with scale.										
16 students.....	4.0	5.6	6.0	5.4	5.2	6.6	5.5	4.5	5.6	5.1	"									
22 students.....	5.6	4.5	3.9	3.5	4.6	3.8	4.3	6.6	6.6	6.6	"									
23 students.....	5.1	4.2	4.0	5.4	4.7	3.5	4.5	3.4	6.0	4.7	Trained on scale, but graded without.									
13 students.....	3.7	4.2	6.1	2.8	4.8	7.0	4.8	7.6	5.8	6.7	Never had seen the scale.									
7 instructors....	3.6	4.9	4.1	4.9	4.7	7.1	4.9	4.6	7.1	5.8	Without scale before having graded with it.									
	No.	5	16	11	13	20	of	4	17	15	14	6	9	of						
No. sample.....	1																			
True grade.....	68.5	68.4	65.2	65.2	60.5	60.0	M. V.	58.6	56.2	50.9	50.2	M. V.	48.9	44.6	M. V.					
7 instructors....	6.7	5.0	11.3	6.7	6.2	6.7	7.1	5.8	6.3	5.0	4.2	5.3	3.3	5.8	4.5					
16 students.....	7.0	5.9	7.2	6.4	6.3	7.1	6.7	7.9	5.0	5.8	5.5	6.1	6.0	4.3	5.1					
22 students.....	5.2	6.8	4.6	8.1	4.9	7.3	6.2	8.5	7.6	6.5	6.5	7.3	7.0	6.9	7.0					
23 students.....	5.4	5.2	7.8	13.0	6.7	7.5	7.5	6.3	8.4	10.2	10.4	8.8	8.8	11.8	10.3					
13 students.....	12.1	9.2	12.7	13.8	22.8	13.1	14.0	14.6	10.7	12.4	18.4	14.1	19.1	15.8	17.5					
7 instructors....	7.7	8.6	8.6	12.6	9.1	8.6	9.2	8.3	11.1	9.7	12.6	10.4	6.7	9.0	8.3					

tion of teachers and students and the distinct influence of the institutional passing grade (70 per cent. at Illinois) in restricting the range within which one "feels" he can grade a given product. Students, when marking without the aid of the Scale, show three times as much mean variation as when marking with it (15 per cent. to 5 per cent.)

5. In grading samples at the 85-100 per cent. end of the Scale both instructors and students show no larger mean variations in marking without the Scale than in marking with it. In grading samples between 60-70 per cent. without the Scale the students show twice as much mean variation as with it, and instructors show one-third again as large a mean variation as with it. In grading samples below 60 per cent. both show nearly twice as large mean variations without the Scale as with it.

6. Students who have been trained in drawing and lettering, but who have never used the Scale, show nearly twice as large a mean variation in grading samples below 70 per cent. without the Scale, and half again as large a mean variation with samples ranging from 70 to 80 per cent., as students trained in use of the Scale and grading with it.

7. Students who have had a few weeks' training in the use of the Scale, when grading samples above 75 per cent. without the aid of the Scale, show mean variations practically identical with those of students grading the same samples with the aid of the Scale. With samples below 60 per cent. the mean variations of the students grading without the Scale are larger. *Students trained in the use of the Scale when grading without it show a smaller variation at the high end of the Scale than those not trained in the use of it, and show a variation only half as large at the middle and low end of the Scale.*

C. Comparative Practice Curves of Classes in Lettering, 1913 and 1914.

All students in the 1913 and 1914 classes in lettering taught by the writer have been arranged in groups as determined by the efficiency of their initial lettering product (the average of their first week's work). This division gives us four groups of students as follows: Group 1, initial product above 70 per

cent.; group 2, initial product 60 to 70 per cent.; group 3, 50 to 60 per cent.; group 4, below 50 per cent. The practice curves obtained from the average grades given the samples of each of these four groups in the two years are plotted in Diagrams 1 and 2. Examination of these curves and the detailed data shows that all groups of the 1914 class, using the Scale and the improved method, maintain a higher efficiency during each of the first seven weeks than do the corresponding groups of the 1913 class. The shape of the time curves for the two classes will be better understood if it is stated that the time was consciously held at a uniform level during the seven weeks of the 1914 work, whereas with the same work in 1913 the class was allowed to run down the time curve as succeeding weeks went on. The increase in efficiency in 1914 over 1913 has come with almost no individual instruction from instructor to student. Constant comparison of samples with the Scale is developing in the student a greater precision in analyzing the faults in his own technique and functions as a spur to raise the quality of his own product. The detailed argument concerning this phase of the work will be found in a monograph on the "Practice Curve in Free Hand Lettering" shortly to be published.

DIAGRAM 1.

Progress of thirty-one students in an average college class. Curves show average grades for groups of varying initial ability during a semester of fifteen weeks.

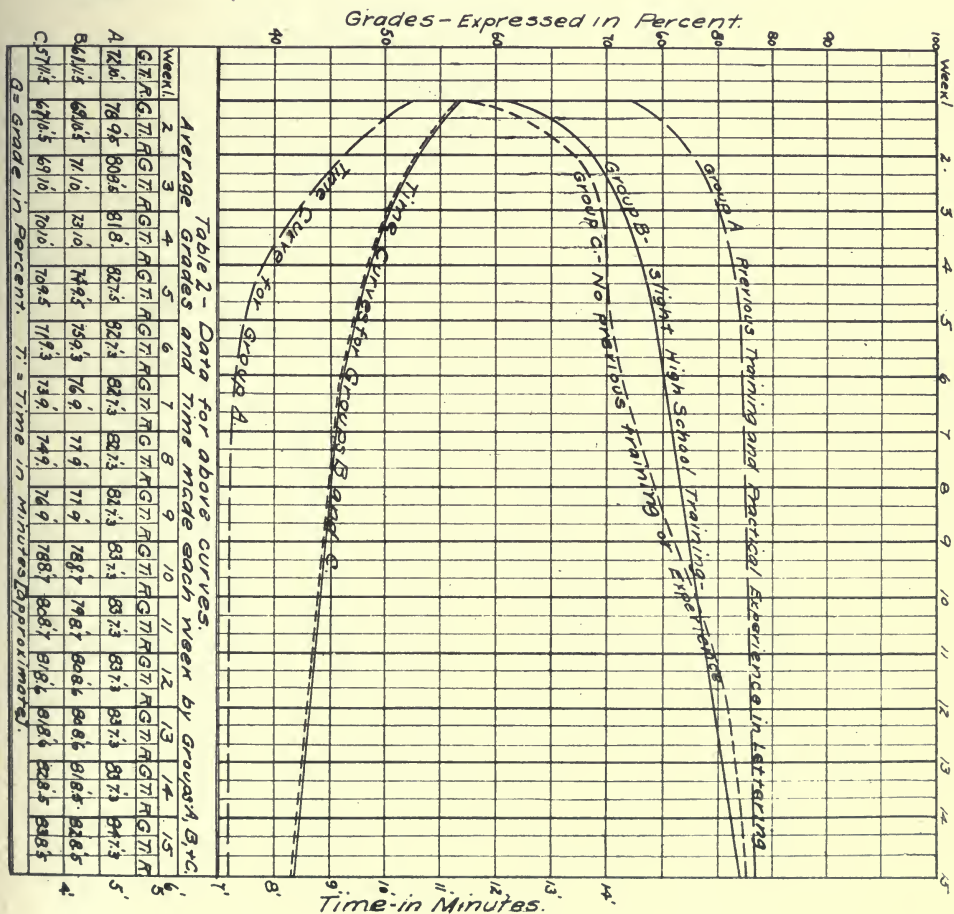
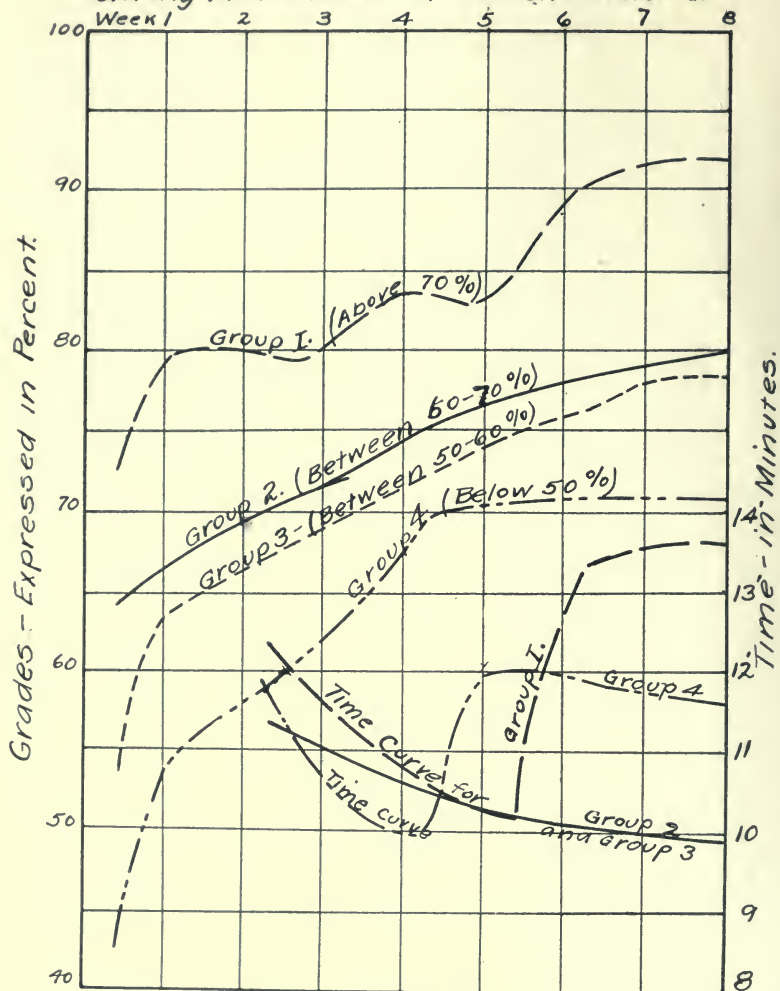


Diagram 2.

Progress of 37 students in an average college class. Curves show average grades for four groups of varying initial ability during first 8 weeks of current semester.



THE BINET TESTS APPLIED TO INDIVIDUALS OVER TWELVE YEARS OF AGE.

ALICE C. HINCKLEY, M.A.

Columbia University,

New York Clearing-House for Mental Defectives.

This study is based upon two hundred cases, thirteen years old and over, taken in order of admission to the New York Clearing-house for Mental Defectives, New York Post-graduate School of Medicine. The Goddard Revision of the Binet Tests—a copy of which is embodied in this report—was used, and his technique followed as closely as is possible without the use of a stop watch and a recorder. The tests were applied by three graduate students of the Department of Experimental Psychology of Columbia University, who had had previous experience in applying these and other tests.

The distribution, according to chronological age, of the two hundred cases, is shown graphically in Figure 1. The sudden drop at the sixteenth year and the irregularity in the more mature years is without psychological significance, being due to sociological conditions at the clinic. Mature defectives are less likely to be discovered by social workers or brought in by relatives. Many mature patients who attend the clinic for neurological treatment are not given the mental examination; and it is readily conceivable that many persons over fifteen years of age, though of nine, ten or eleven mental age, may be engaged in minor occupations and their feeble-mindedness thus escape notice. The distribution for mental age is seen in Figure 2. Its most noticeable feature is the depression in the ninth year, the cause for which will be noticed later in the examination of the relative difficulty of the individual questions. Figures 3, 4, 5, 6, give the distribution of boys and girls separately. That for the boys follows more closely the outline of the combined distribution except that in the chronological age the drop comes in the fifteenth year instead of the sixteenth; but, as stated before, this is due to a sociological rather than a psychological condition.

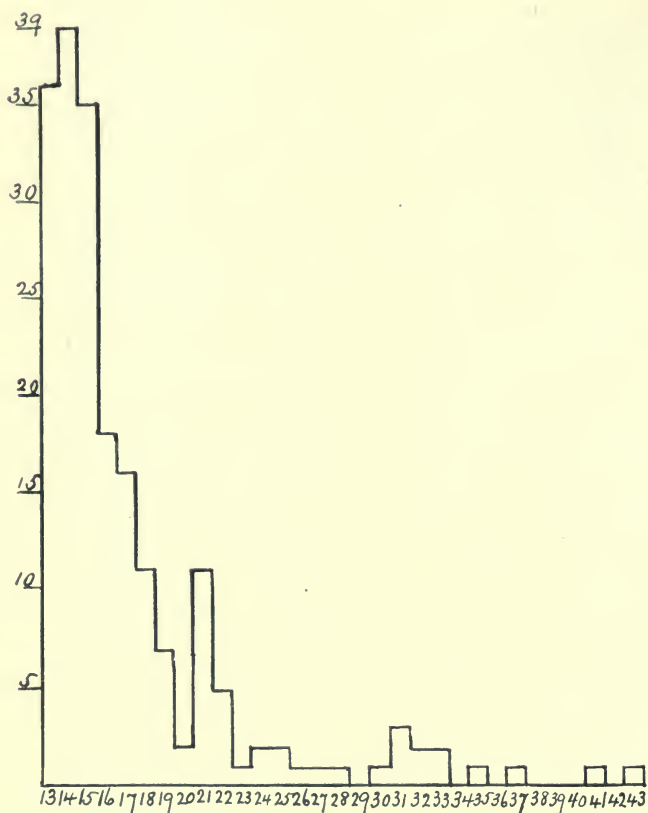


Figure 1. Chronological age of the 200 cases — both sexes — 13 yrs. to 43. Vertical figures show no. of cases.

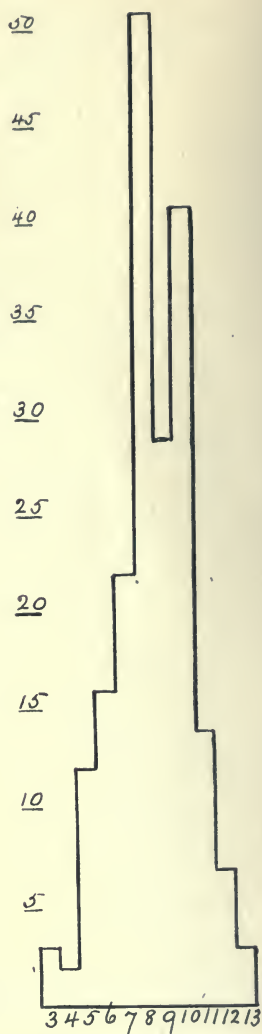


Figure 2. Mental age of 200 cases, 3 to 13.

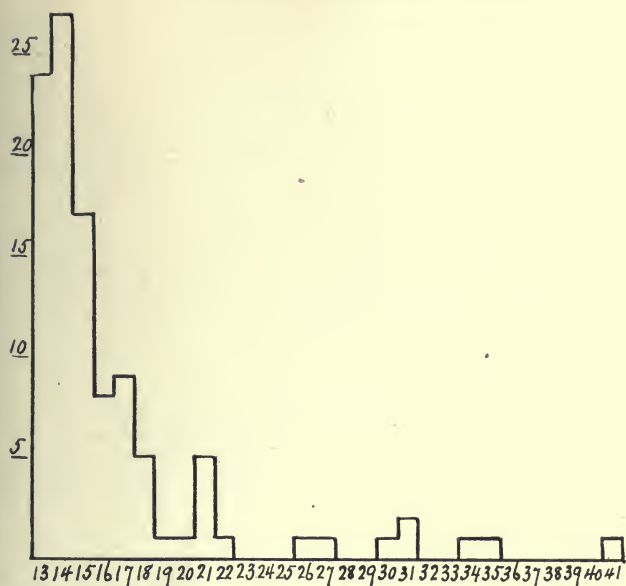
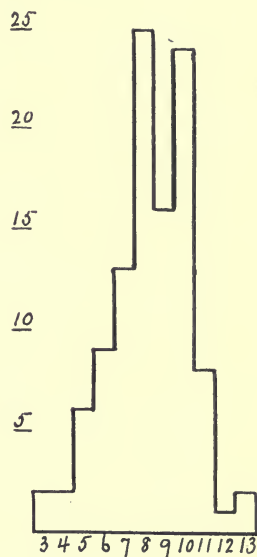


Fig. 3. Chron. age 108 boys, 13 yrs. to 41.



5. Ment. age 108 boys.

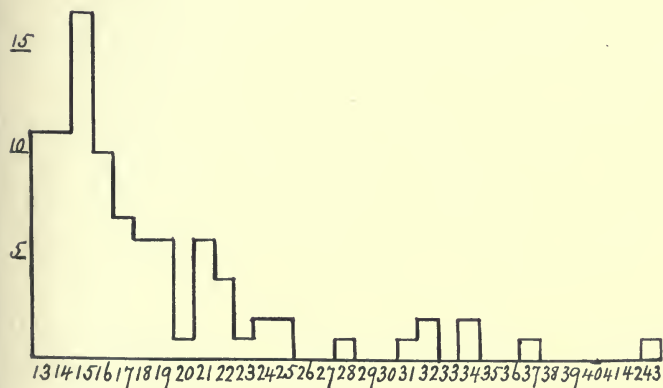
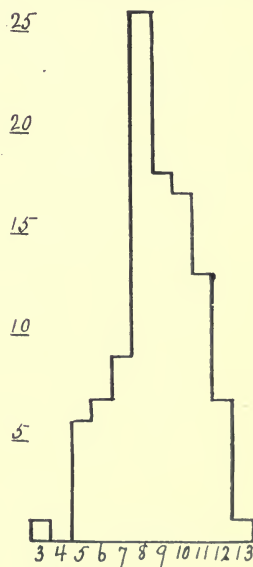


Fig. 4. Chron. age 92 girls, 13 yrs. to 43.



6. Ment. age 92 girls.

III.

- 1 Points to nose, eyes, mouth.
- 2 Repeats, "It rains. I am hungry."
- 3 Repeats 7 2.
- 4 Sees in Picture 1.
 - 2.
 - 3.
 - 4.
 - 5.

IV.

- 1 Knows sex, boy or girl (girl or boy).
- 2 Recognizes key, knife, penny.
- 3 Repeats 7 4 8.
- 4 Compares lines.

V.

- 1 Compares 3 and 12 grams. 6 and 15 grams.
- 2 Copies square (over).
- 3 Repeats, "His name is John. He is a very good boy."
- 4 Counts four pennies.
- 5 "Patience."

VI.

- 1 Morning or afternoon (afternoon or morning).
- 2 Defines fork

table	horse
chair	mama
- 3 Puts key on chair; shuts door; brings box.
- 4 Shows R. Hand: L. Ear.
- 5 Chooses prettier? 1 & 2. 4 & 3. 5 & 6.

VII.

- 1 Counts 13 pennies.
- 2 Describes pictures. (Sec. III, 4.)
- 3 Sees picture lacks eyes, nose, mouth, arms.
- 4 Can copy diamond (over).
- 5 Recognizes red, blue, green, yellow. (Time 6''.)

VIII.

- 1 Compares (Time 20'')

Butterfly	Wood
Fly	Glass
- 2 Counts backward 20-1.
- 3 Repeats days. M. T. W. T. F. S. S. (Time 10''.)
- 4 Counts stamps. 111222. (Time 10''.)
- 5 Repeats 4 7 3 9 5.

Paper
Cloth

IX.

- 1 Makes change 20c.—4c.
- 2 Definitions. (See VI, 2.)
- 3 Knows date.
- 4 Months. J. F. M. A. M. J. J. A. S. O. N. D. (Time 15''.)
- 5 Arranges weights. (2 correct.) (1' each.)

1.	2.	3.
----	----	----

X.

- 1 Money. 1c. 5c. 10c. 25c. 50c. \$1. \$2. \$5. \$10.
- 2 Copies design.
- 3 Repeats 8 5 4 7 2 6. 2 7 4 6 8 1. 9 4 1 7 3 8.
- 4 Comprehends.

(1st Series time 20''.)	(2nd Series time 20''.)
(2 out of 3.)	(3 out of 5.)
1.	1.
2.	2.
3.	3.
	4.
	5.
- 5 Sentence: Philadelphia, Money, River. (Time 1'.)

XI.

- 1 Sees absurdity. (3 out of 5.) (Time 2'.)
 - a. Unfortunate painter.
 - b. Three brothers.
 - c. Locked in room.
 - d. R. R. accident.
 - e. Suicide.
- 2 Sentence: Philadelphia, Money, River. (See X, 5.)
- 3 Gives 60 words in three minutes. (over).
- 4 Rhymes (time 1' each). (3 Rhymes.)

day	mill
spring	door
- 5 Puts dissected sentences together. (Time 1' each.)
 - a. We started at an early hour for the park.
 - b. I have asked the teacher to correct my paper.
 - c. A good dog defends his master bravely.

XII.

- 1 Repeats 2 9 6 4 3 7 5. 9 2 8 5 1 6 4. 1 7 9 5 8 4 7.
- 2 Defines Charity.

Justice.

Goodness.
- 3 Repeat, "Children, it is necessary to work very hard for a living. You must go every morning to your school."

"The other day I saw in the street a pretty young dog. Little Maurice has got spots on his new apron."

"Ernest is praised very often for his good conduct. I bought at the store a beautiful doll for my little sister."

"There occurred on that night a frightful tempest with lightning. My comrade has taken cold. He has fever and coughs very much."
- 4 Resists suggestion. (Lines.)
- 5 Problems: (a) Hanging from limb. (b) Neighbors visitors.

XV.

- 1 Interprets picture.
- 2 Change clock hands. 6.20 = 2.56 =
- 3 Code. COME QUICKLY.
- 4 Opposites.

1 good	3 quick	5 big	7 white
2 outside	4 tall	6 loud	8 light
			9 happy
			10 false

The purpose here is to study the results of the Binet Tests as applied to mental defectives over 12. It was suggested by the fact that whereas the younger feeble-minded children reached the limit of their possible response very soon after the age series in which all questions were correctly answered—usually one or two succeeding years, with a correct answer here and there—many of the older ones, proportionately, began on a lower series and gave straggling returns over a wide range of series—sometimes extending over the questions for six or eight years. In some instances where complete or approximate failure was shown in earlier years, they have succeeded with the questions of later series. The limit of the range for each subject is shown by correct answers for all the questions of one age series at the beginning, and failures for all the questions of one age series at the end. In Table I this is designated as the limiting number of series. It will be noticed that the 10 subjects who were obliged to go back to the third-year questions, in order to get a positive series, ranged in series from 3 to 10 and in chronological age from 13 to 35, while their mental range was from 2.8 to 6.2 years. The 33 subjects whose range of series was 7 to 14 were from 13 to 41 years old with a mental range from 7 to 11 years. If the averages are taken the results are less spectacular: the average mental age shows a fairly regular increase, the advancement being conditioned on the control of the material; the average chronological age is irregular and with the average deviation and probable error as shown precludes any deduction of value. The table is of interest as showing how the tests go: it illustrates the fact that a wide range of chronological age had to use questions covering a wide range of series; and it shows that the few who began at a later series had to be younger, and that they reached a higher mental average. It also suggests a further inquiry as to whether the older subjects are more deficient than the younger, and whether the tests are a reliable scale for them.

The distribution for boys and girls for each chronological age is given in Figures 7, 8, 9, 10, 11, 12, 13, 14, 15, 16; and for the 18-to-43-year group in Figures 17 and 18. This is shown again in Figures 19, 20, 21, 22, where the single years are com-

TABLE I.
Limiting No. of Series.

R. of Series.	Ave. of Series.	R. of Chr. Age.	Ave. Age.	A. D.	P. E.	R. of Ment.	Ave. Ment.	A. D.	P. E.	Ment. Coef.	No. Cases.
3-10	3-8	13-35	18.	4.8	1.3	2.8-6.2	4.4	.9	.26	.24	10
4-13	4-9	13-31	17.	3.	.6	5.-8.4	6.3	.7	.14	.37	18
5-14	5-11	13-43	20.	7.	1.2	6.-9.6	7.3	.7	.12	.36	22
6-14	6-11	13-33	17.	3.	.5	6.6-9.6	8.	.5	.08	.47	30
7-14	7-11	13-41	18.	3.6	.5	7.-11.	8.9	.75	.11	.49	33
8-14	8-12	13-25	17.	2.8	.3	8.6-12.4	10.	.7	.08	.59	51
9-14	9-13	13-28	17.	3.7	.67	9.4-12.4	10.9	.6	.11	.63	21
10-14	10-13	13-21	15.5	1.8	.5	10.4-12.	11.2	.5	.14	.72	10
11-14	....	14-21	....	...	...	12.2-13.4	....	...	...	...	2
12-14	....	13-23	....	...	...	12.6-12.4	....	...	...	...	2
15-	....	21-	....	...	...	15.	....	...	...	...	1
											200

bined in two groups—the 13-14 and the 15-17. The final combination into three groups is seen in Figures 23, 24 and 25; and these three groups, 13-14, 15-17, and 18-43, as giving the most even division of the 200 cases, are used as the basis of comparison. Of those who reached nine years and over, the first group contains 46; the second, 39; the third, 31; 10 years and over, the first group, 36; the second, 23; the third, 22.

TABLE II.

Chrono- logical Age.	Boys.					Girls.				
	M.				M.					
	No.	Age.	A. D.	P. E.	P. E.	A. D.	Age.	No.		
1.	13.....	25	9.0	1.6	.27	.4	1.6	8.7	11	
	14.....	28	9.0	1.5	.23	.48	1.8	9.3	11	
2.	15.....	18	8.0	1.6	.32	.24	1.2	8.8	17	
	16.....	8	8.8	2.2	.66	.38	1.4	9.5	10	
	17.....	9	8.3	1.2	.33	.28	1.1	9.0	7	
3.	18-43..	20	8.3	1.4	.26	.27	1.8	8.8	35	
Group										
1.....	53	9.0	1.5	.17	.30	1.7	9.0	22		
2.....	35	8.3	1.7	.24	.17	1.2	9.0	34		
3.....	20	8.3	1.4	.26	.27	1.8	8.8	33		

Table II gives for boys and girls separately the average mental age, average deviation and probable error for each chronological age up to 18, and then for each of the three groups. If there is any increase in defectiveness with advance-

ing maturity, it should appear in the comparison of these three groups. The average mental age of boys of the first group is nine years and of the second and third groups 8.3 years. In comparing the first and second we find the probable error of their difference, .7, to be .28; the probable error of the difference between the first and third is .31; and the probable error of the difference between the second and third is .34. So that, after all due allowance for deviation and error, there remains with the first group (13-14) an advantage of .42 over the second group, and of .39 over the third group. The case of the girls is not so plain, the average mental age of the first and second groups being nine, and of the third, 8.8. The probable error of the difference between the first and second groups is .37; between the first and third groups, .40; and between the second and third groups, .32.

The next question suggested by this material is whether the Binet tests give a steadily increasing scale, and hence provide a measure of mental ability, over 12 years of age. Table III gives the percentage of error of the three groups for each mental age series. The age series increase everywhere except from three to four in difficulty as you go from lower to higher series, but not uniformly. That is, the fifth year is harder than the fourth, the sixth than the fifth, and so on; but instead of advancing regularly in difficulty there are decided jumps, noticeably from the seventh to the eighth, from the eighth to the ninth, and from the tenth to the eleventh. Of these jumps, the first is most pronounced in the 13-14 group; the second in the 15-17 group; and the third is equally prominent in the three groups. The third and fourth-year series are equally easy for adults.

We are now ready to consider whether the four or five single tests included by Binet under each year are of equal difficulty as applied to adults. The distribution of errors for each question for the 200 cases is shown graphically in Figure 26. In the main, there is indicated a general advance in difficulty, but it is confused with a remarkable irregularity and sawing back and forth from question to question even greater than has appeared in our study of their relative difficulty from one age series to another. A better chance to get at this situation is

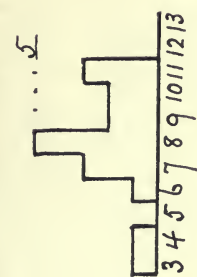


Fig. 11. Ment. age
18 boys 15 yrs. old.

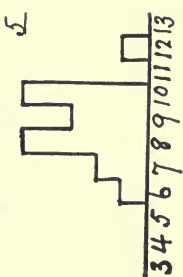


Fig. 12. Ment. age
17 girls 15 yrs. old.

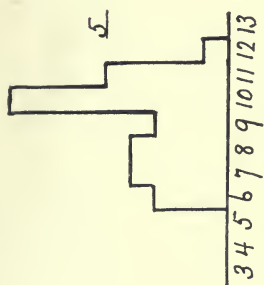


Fig. 9. Ment. age
28 boys 14 yrs. old.

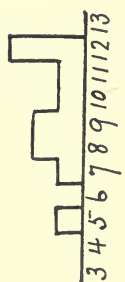


Fig. 10. Ment. age
11 girls 14 yrs. old.

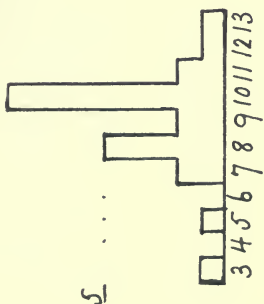


Fig. 7. Ment. age
25 boys 13 yrs. old.

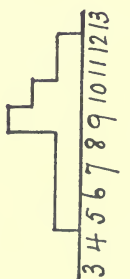


Fig. 8. Ment. age
11 girls 13 yrs. old.



Fig. 13. Ment. age
8 boys 16 yrs. old.



Fig. 15. Ment. age
9 boys 17 yrs. old.

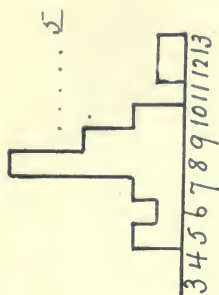


Fig. 17. Ment. age
20 boys 18 to 43 yrs.

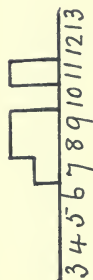


Fig. 16. Ment. age
7 girls 17 yrs. old.

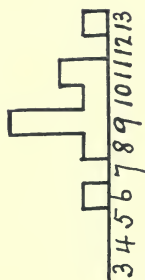


Fig. 14. Ment. age
10 girls 16 yrs. old.

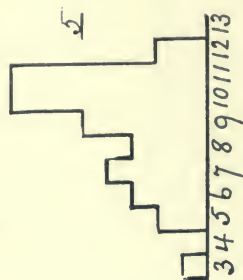
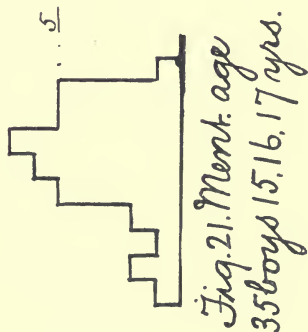
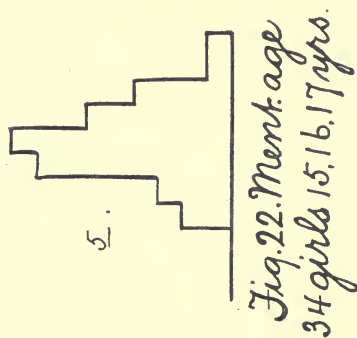
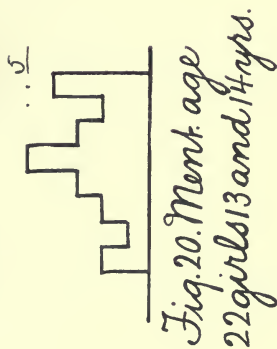
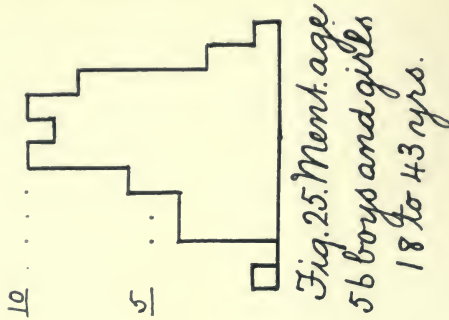
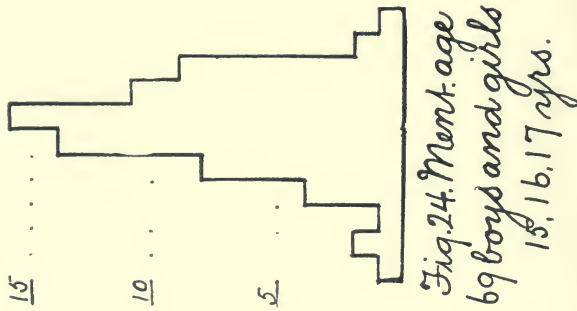
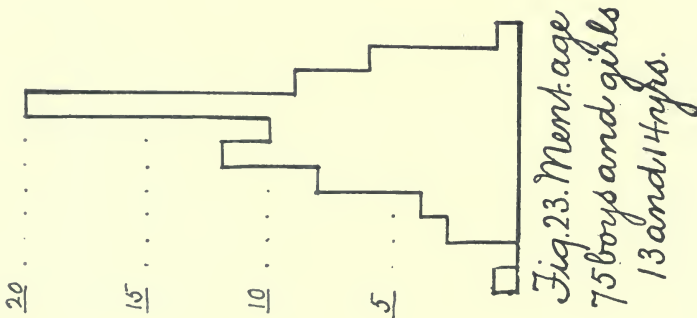


Fig. 18. Ment. age
36 girls 18 to 43 yrs.





afforded by Table III, which gives the percentage of error for each question and makes the discrepancies between questions in each age-series apparent. The results for the fifth year

vary from 4 to 8 per cent. of error; the sixth year from 7 to 16 per cent.; the seventh year, from 5 to 30 per cent.; the eighth year from 15 to 36 per cent.; the ninth year, from 30 to 66 per cent.; the tenth year, from 23 to 77 per cent., and so on. These are rather striking differences in questions that have been standardized on the basis of at least 75 per cent. of correct answers for each question with large numbers of children of the specified age. Not only are discrepancies found within a given age-series, but there are cases where later questions

TABLE III.
Per Cent. of Errors for Each Question.

No. Cases.	Year.	1	2	3	4	5
3	3	0	2	0	2	..
2	4	1	0	2	2	..
12	5	8	6	7	4	6
16	6	11	7	16	10	9
22	7	5	15	16	30	12
51	8	36	29	15	34	33
29	9	44	66	40	30	63
41	10	23	77	51	65	65
14	11	80	74	62	68	93
10	12	81	87	95	80	86
..	15	88	94	96	79	..

are easier than earlier ones. The first question in the seventh year, for example, which requires the counting of 13 pennies, has a lower per cent. of error than any question in the sixth year, and than any in the fifth year except the fourth question—to count four pennies. The third question in the eighth year—repeating the days of the week—is another instance; it being easier than three of the seventh-year questions and than one of the sixth year. The same is true of the fourth question in the ninth year—naming the months—and of the first question of the tenth year—recognition of the different denominations of money—whose 23 per cent. of error proves it to be easier than all of the ninth-year questions, all of the eighth-year questions except the third—naming the days—and than one of the seventh-year questions. From the seventh year on, with the exception of the twelfth year, every year has at least one question that would seem to be as much as two years out of place. The fourth question in the fifteenth year—opposites—seems to rank with the eleven-year questions. Coming at it the other way around and considering the misplacement

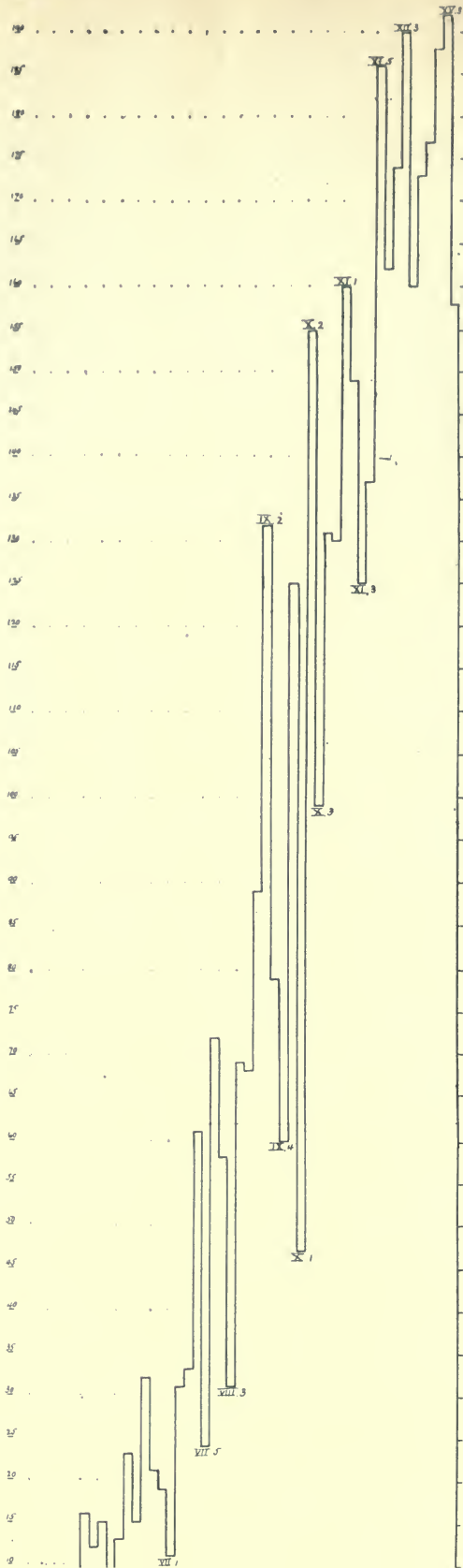


FIGURE 26.—Number of errors for all questions. 200 subjects, ages 13 to 43 years, inclusive.

of the difficult questions, it would appear that the fifth question of the eleventh-year series—putting dissected sentences together—with its 93 per cent. of error; the third question of the twelfth-year series—repeating long sentence—with 95 per cent. of error; and the second and third questions of the fifteenth-year series—changing the hands of the clock and the using of code—with 94 and 96 per cent. of error, respectively, would have no place at all of value for this particular group of individuals.

The evidence would seem to point to the conclusion: (a) that there is an increase of feeble-mindedness to some extent with advancing maturity over 12 years of age, especially for boys; (b) that the Binet tests do not give a scale of steadily increasing difficulty for adults; and (c) that the questions for any one year are not of equal difficulty for adults. How to account for this is another matter and necessitates some speculation.

The increase of feeble-mindedness with advancing age beyond 12, with the limiting number of age-series extending over a range of six or eight years, does not agree with Goddard's theory that a 40-year-old boy of eight can not only do what one eight-year-old boy can do, but what a great many eight-year-old boys can do. This evidence points to his being able to do a little of what a six, seven, eight, nine and ten-year-old boy can do. The increase in defectiveness may be due to the close retirement in which mature defectives are kept at home, without developmental activity or stimulation for what mentality they possess and so it fades out from disuse; or it may be due to physiological degeneracy, as in senility. The activity of social workers under the stimulus of recent agitation on this subject, connected with the establishment of The Clearing-house for Mental Defectives, where they may be examined and assigned to custodial care if necessary, has brought many of these defectives into notice who otherwise would have completed their existence in the seclusion of their homes. The increasing feeble-mindedness of boys in excess of that of girls is in accord with the conclusion that males show greater variability, and this is the negative end of the curve of distribution.

The irregularity in the increase in difficulty of the Binet

tests as here shown is probably due to the peculiarity of the adult reaction to them, as stated before. A sudden acquisition of difficulty is shown in the eight-year series, with such requirements as stating differences between familiar things, counting backward, counting and giving value of stamps, and repeating five numbers. Some interference may be due to the unusualness of being asked, for no apparent reason, to do these unfamiliar performances with familiar things, and some to their inability to adapt themselves to a new situation and follow directions as a young child does. What mentality they have may be centered on something else—whether they are doing well, for instance, or making a good appearance; or they are wholly engrossed with self-satisfaction at their supposed achievement—rather than on the disconnected requirements presented.

The irregularity in the difficulty of the individual questions within any one year-series or from one year-series to another may probably be accounted for in the same way. The easy ones—as counting four pennies, V, 4; defining fork, table, chair, horse, mama, VI, 2; counting 13 pennies, VII, 1; repeating days of week, VIII, 3; repeating months, IX, 4; recognizing different denominations of money, X, 1; giving 60 words in three minutes, XI, 3; telling which line is longer (in six pairs), XII, 4; opposites of simple words, XV, 4—are more or less familiar and do not take them out of frequented paths of experience. But when they are asked to choose the heavier of two very small weights, V, 1; to copy a diamond, VII, 4; to compare two things, VIII, 1; to give definitions (better than use) for fork, table, chair, horse, mama, IX, 2; to arrange five very small weights in order, IX, 5; to draw a complicated design (two figures) from memory, X, 2; to see the absurdity in five stories in two minutes, XI, 1; to put dissected sentences together, XI, 5; to repeat a sentence of 26 or more syllables, XII, 3; in imagination to change the hands of a clock and tell the time, XV, 2; in a few minutes to learn a code sufficiently to write a short message from memory, XV, 3; some confusion and interference may well be expected to befog their mental atmosphere. Mental habits and even stupidity become more fixed with time, and the Binet tests as now arranged do not allow for overcoming the inertia of maturity.

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VOLUME VI

JANUARY, 1915

NUMBER 1

EDITORIALS.

Critics of public education are wont to lay large emphasis upon statistics of school attendance, and especially upon the relatively smaller enrollments in the upper grades and the high schools as compared with the enrollments in the lower grades. The inference commonly drawn is that the school programs are not adjusted to the needs of adolescent boys and girls. This maladjustment may be a fact (beyond doubt a more adequate adjustment is both necessary and feasible), but one may easily turn the statistics into an apparent proof of the school's complete failure when, as a matter of fact, they show convincingly that, in spite of maladjustments and other evils, public education is fairly successful if success is to be measured by the enrollment standard.

Perhaps the most stupid mistake is to make crude comparisons of figures without stopping to inquire what they mean. Thus when one finds that the high-school enrollment is only 6.5 per cent. of the elementary-school enrollment, one may jump to the conclusion that the high schools receive only 6.5 per cent. of those entering the elementary school, and consequently that 93 per cent. of those entering are eliminated during the first eight years. The absurdity of this

inference is apparent when we remember that the high-school course is only four years in length (and in many communities less than four years), while the elementary course almost universally covers eight years; consequently we could never expect the high-school enrollment to be more than half the enrollment in the elementary schools. Beyond this, the growth of population must be taken into account, and this in the course of eight years (covering the time that lapses before a generation entering the first grade reaches the high school), is a factor of some magnitude.

But even good schoolmen, without the opportunist's craving to prove our educational system a gigantic failure, have committed another fallacy in comparing school enrollments at different age-levels without including in the comparison a reference to conditions in preceding decades. For example, Principal W. D. Lewis, in a very suggestive little book, *Democracy's High School*, just from the press, compares the enrollments in different years of the high-school course as follows: Out of 100 boys in the first year,

"41 boys will not return the second year, 62 of the original 100 will not return the third, and 76 will not return the fourth. Of the 24 left, somewhere from 5 to 10 will go to college. Here, then, are the American Beauty roses, for which we have pinched off 90 to 95 buds."

In order to determine whether the figures given indicate a tendency toward *increased* elimination, the writer had the growth of the high schools in Illinois during a period of eight years computed by classes. Several facts were brought to light. In the first place, the high-school enrollment of Illinois has grown during that period 800 per cent.; the population has increased approximately 100 per cent.—in other words, the high schools have grown eight times as fast as the population. In the second place, the proportion of fourth-year pupils to third-year pupils has increased steadily, decade by decade; hence "elimination" has steadily declined. In the third place, during the past five years the growth of the third and fourth-year classes has been much more rapid proportionately than during any preceding five-year period. In the fourth place, the proportion of boys to girls in the high schools has increased steadily, and is still increasing. While the upper classes in the high schools are smaller than the lower classes, the chief reason is not elimination, *but the marvelous increase in the first-year classes*. The high-school enrollment in the country at large has increased approximately ten times as fast as the population in the last twenty-four years, and is

still growing at a rapid rate. So long as this growth continues one must expect absolutely more pupils in the first year than in the succeeding years, and the contrast of the first year with the fourth year, covering as it does three years of very rapid growth at the lower end, will be particularly misleading. When the upper classes of the high school approximate in numbers the lower classes, it will mean that the high school *has stopped increasing its enrollment proportionately to the population*. Mr. Lewis may be right in his contentions, but the inference that the reader draws from his figures does a marked injustice to those who have been responsible for the growth of the high schools during the past three decades.

Another comparison that has not yet been taken up by the critics may well be discounted against the time when they stumble across the statistics. The Report of the Commissioner of Education reveals some figures that, at first glance, are most disquieting. In many of the States the ratio of public-school enrollment to total population has declined steadily since 1870. In New York, for example, the enrollment in public schools in 1870-71 was 23.18 per cent. of the total population; in 1911-12, it was only 15.3 per cent. The decline has been progressive, each decade showing a lower proportion than the preceding. The same condition holds in certain other States, particularly in the States containing the large cities, but it is not so noticeable in States the population of which is still predominantly rural. Indeed, in some of the latter, especially in the South, the per cent. of enrollment to total population has increased significantly.

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SCHOOL ENROLLMENT.**

When one seeks for an explanation of this decline, a significant cause is found in the decrease in the size of the average family—and this, too, is more noticeable in the urban than in the rural population. This means that today in certain States there are actually fewer children in proportion to the total population than in 1870—and a decrease of one individual in the size of the average family will make a very large difference in the ratio of school population to total population.

This, however, does not satisfactorily explain another showing revealed by the Commissioner's tables, namely, that the public-school enrollment has decreased during this period not only in proportion

to the total population, but also *in proportion to the population of school age*. This, too, is largely limited to the thickly-populated States with large areas of urban territory. The explanation here is undoubtedly the relative increase in the parochial-school enrollment. The Roman Catholic parochial schools, for example, enroll upward of 1,500,000 children, or about *seven and one-half per cent. of the total school enrollment*. It is safe to say that this proportion has steadily increased since 1870, when it was practically negligible. This would much more than account for the decrease that the Commissioner's figures show, and the conclusion is forced home that, in spite of the smaller size of the average family, the total school enrollment, taking public and parochial schools together, has increased steadily, not only absolutely, but proportionately, both to the total population and to the population of school age. When we turn to the Census reports we find this inference abundantly confirmed for the decade 1900-1910. (Data are not available for previous decades.) More children were attending school in proportion to the population in 1910 than in 1900; and, not only this, but throughout the country there was a proportionate increase *in every age-group* in attendance upon the schools. The only exception is in one State—Nevada—and there the decrease was confined to one age-group. The Federal census, unlike the Commissioner's report, includes data from all types of schools.

To strive for the improvement and extension of educational facilities is a most laudable endeavor; but to charge that the present organization of the schools is a complete failure as shown by statistics of decreasing enrollment is a rank injustice. It would be refreshing to find a "reformer" who would start with the frank admission that those who preceded him had achieved through their struggles and efforts something besides failure.

W. E. B.

A CORRECTION.

In the December number of the JOURNAL an error in making up the forms caused some confusion in Professor Thorndike's communications on page 597. Table I and the comment below it go with the first communication, and should be at the top of the page. The beginning of the second communication should be transposed to the lower half of the page.

In Professor Dearborn's review of Morton Prince's *The Unconscious*, page 600, line 8, the word "censure" should have been "venture."

PUBLICATIONS RECEIVED.

(Notice in this section does not preclude a more extended review.)

EARL BARNES *The Psychology of Childhood and Youth*. New York: B. W. Huebsch, 1914. Pp. 68. 50 cents.

This is an outline syllabus of thirty lectures with selected references for further reading at the end of each lecture. The object of the course is to "outline the results of the more recent individual and group studies on the physical, mental, moral, social, esthetic and religious life of childhood and youth." The outlines show that the author is conversant with recent developments in child psychology, and the ideas advanced are stimulating and suggestive.

EMMA MILLER BOLENIUS. *The Teaching of Oral English*. Philadelphia: The J. B. Lippincott Co., 1914. Pp. xii, 214.

This book represents an effort to carry out the recommendations of the National Council of Teachers of English, and to put in concrete form the suggestions that have recently appeared in the *English Journal* relative to greater emphasis on oral English in the teaching of English composition. It attempts to apply the laboratory method to the development of facility in pupils' thinking and expression. It is constructed upon sound principles of child psychology.

LOUISE CREIGHTON. *The Social Disease and How to Fight It*. New York: Longmans, Green & Co., 1914. Pp. 87. 36 cents.

This book was written by an English woman, an ardent suffragist, to prepare the minds of the women of England for a thorough and searching study of the whole question of the social evil, and for the campaign of enlightenment which is to be waged when the findings of the Royal Commission on Venereal Diseases shall have been made public. The author argues that the origin of the whole group of social evils is to be found in the double standard of morality for men and women, and shows that the eradication of the double standard can only be brought about by a slow process of education in which the women will probably have to take the lead.

WILLIAM SILLIMAN FOSTER. *On the Perseverative Tendency*. Reprinted from the American Journal of Psychology, Vol. 25, No. 3, July, 1914. 393-426.

The term "perseverative tendency" has played a prominent part in recent discussions of the memory process—particularly those emanating from G. E. Müller and his pupils. The author shows that the term has been used in many different senses, and his experimental work raises a doubt as to the existence of such a tendency in the

sense of the spontaneous recurrence of experiences without associative connection.

OSCAR GERSON. *Instruction in the Grades. Values and Methods.*

New York: Hinds, Noble & Eldredge, 1914. Pp. xii, 273. \$1.25.

A series of plain, practical, common-sense talks on the teaching of reading, composition, spelling, grammar, arithmetic, geography, history and physiology. The author's reflections are expressed with a certain charm and fluency, but his psychology is of the most formal type, and there is not a trace of the influence of modern experimental studies in the teaching of school subjects.

FRANK L. GLYNN. *Some Trade Schools in Europe.* Bulletin No.

596. Washington: Bureau of Education, 1914. Pp. 76.

Presents the results of first-hand observations made on selected trade schools in Great Britain, France, Germany, Austria, Belgium, Switzerland and Italy. Of particular value is the account of the relations between the apprentice system and the schools of the various countries.

KARL POMEROY HARRINGTON. *The Roman Elegiac Poets.* Cincinnati:

American Book Co., 1914. Pp. 444.

A textbook for colleges, containing discriminating selections from the whole field of Roman elegy. There is an interesting introduction on the history of the elegy.

NATHAN A. HARVEY. *The Feelings of Man, Their Nature, Function and Interpretation.* Baltimore: Warwick & York, 1914. Pp.

viii, 276. \$1.60.

The author's statement that in spite of the great activity in experimental psychology during the past twenty-five years little advance has been made in the study of the feelings would probably meet with the assent of most psychologists, but it is doubtful whether that is sufficient justification for ignoring in a book of this type practically everything that has been said or done on the subject in that time. The book is frankly devoted to the development of a theory of the feelings, and perhaps on this account the author considers himself absolved from any extended reference to experimentally-determined facts. The James-Lange theory is examined at some length and rejected as inadequate, and the essence of the author's theory is that "feeling is the concomitant of the resistance which a nervous impulse encounters in passing through a nervous arc." The book is written in a popular rather than a scientific style, although there is frequent reference to nerve anatomy and physiology. In the chapter on the relation of feeling to attention it is somewhat surprising to find no reference to Titchener's masterful discussion of the subject.

W. T. HODGES. *Important Features in Rural School Improvement.* Bulletin No. 599. Washington: Bureau of Education, 1914. Pp. 55.

In pursuance of the plan to make the Bureau of Education a clearing-house for all matters of educational interest and improvement, 3500 letters were sent to township, county and district superintendents asking for a report on anything of unusual or special value that had occurred in connection with rural schools in their locality, or any methods that had resulted in improving the efficiency of rural school service. The present monograph was compiled from the replies, and constitutes a report on the vanguard of rural school improvement.

GEORGE W. HUNTER. *A Civic Biology, Presented in Problems.* Cincinnati: American Book Co., 1914. Pp. 432.

A very interesting attempt to secure keen motivation for the study of biology by high-school pupils. There is an increasing demand on the high school to furnish its pupils with an adequate knowledge of fundamental life processes. From the cultural point of view this is of much greater importance than drill in languages and mathematics. The day will soon come when biology will be a subject required of all high-school pupils, and textbooks like the one under consideration will be of great assistance to both teachers and pupils in stimulating interest and in leading on to a more extended study of biology. An attractive feature of the book is the abundance of illustrations.

ROBERT A. KASPER. *Some People Marry.* Boston: Richard G. Badger, 1914. Pp. 122. \$1.00.

An indifferent play which turns upon the social status of one whose birth was illegitimate, but was later legitimized by marriage.

GEORGE TRUMBULL LADD. *What Can I Know? An Inquiry Into Truth, its Nature, the Means of its Attainment and its Relations to Practical Life.* New York: Longmans, Green & Co., 1914. Pp. vii, 311. \$1.50 net.

A laudable and successful attempt to discuss the problem of knowledge in terms which will be familiar to the ordinary educated man. In most entertaining fashion the author pays his respects to Rationalism, Empiricism, Pragmatism, Absolutism, Realism and other schools of epistemological thinking, and in the end prides himself on the fact that the reader has been unable to identify him with any of them.

CYRUS D. MEAD. *Height and Weight of Children in Relation to General Intelligence*. Reprinted from Pedagogical Seminary, Vol. 21, No. 3, September, 1914. 394-406.

A study of 429 feeble-minded children leads to the conclusion that mental defectives are also physically retarded, and that the more decided the mental defect, the greater the physical retardation.

WILLIAM J. MILNE. *Standard Algebra, Revised*. Cincinnati: The American Book Co., 1914. Pp. 496.

A substantial, representative text for secondary algebra. Considerable attention is paid to graphic solutions of both simple and quadratic equations.

PAUL MONROE, Editor. *Principles of Secondary Education*. New York: The Macmillan Company, 1914. Pp. xxviii, 790. \$1.90 net.

An encyclopedic handbook of high-school organization, management and instruction. The discussions of the various phases of high-school work have been written by thirty-one contributors, each a specialist, and in many cases the foremost authority in the field which he considers. It is, therefore, probably the most complete and reliable pronouncement upon high-school matters to be found between the covers of a single book. The first two chapters, by the editor, deal with the meaning, scope and historical development of secondary education; chapters three and four compare European systems of secondary education with the high-school systems of the United States; chapters five and six discuss the organization of the high school; chapter seven treats of the psychology and hygiene of adolescence; chapter eight of moral education; chapters nine to sixteen consider the specific subjects of instruction, including English, the classics, modern languages, the natural sciences, mathematics, history, civics, the fine and household arts; and the remaining five chapters take up such topics as vocational education, hygiene and physical education, athletics, social aspects of high-school education and the reorganization of secondary education. It will be seen, therefore, that the book is of value both for the administrator and the teacher, and will probably dispute with Johnston's volumes on high-school administration and organization the rank of standard treatise on the subject.

MARGARETHE MUELLER. *Elsbeth, a Story of German Home Life*. New York: E. P. Dutton & Co., 1914. Pp. xxi, 296. \$1.25.

This charming story in the "Little Schoolmate Series" will give children an excellent idea of some of the German customs and family relationships which lend to their home life its delightful inti-

macy and "*Gemüthlichkeit*." An attractive feature of the book is the number of German songs, which are translated in the appendix and set to music, so that they may be sung by the readers.

ERASTUS PALMER AND L. WALTER SAMMIS. *The Principles of Oral English*. New York: The Macmillan Company, 1914. Pp. xii, 222. 60 cents.

This is not a book on oral English composition, but deals rather with the first principles of elocution, with especial reference to oratory. There are chapters on breathing, articulation, modulation, vocal inflection and emphasis, with a considerable number of selections for practice.

G. T. W. PATRICK. *The Psychology of Play*. Reprinted from *Pedagogical Seminary*, Vol. 21, No. 3, September, 1914. 469-484.

Reviews the various theories of play, and shows that children's plays and adult sports both have their roots far back in the cultural history of the race. Pleads for a greater recognition of the need for play in modern life.

KARL PEARSON. *The Life, Letters and Labors of Francis Galton*. Volume I. Cambridge: University Press. New York: G. P. Putnam's Sons, 1914. Pp. xxiii, 246. \$6.25.

The two outstanding figures in the English biological world of last century were Charles Darwin and Francis Galton, and, while Darwin has undoubtedly had the greater influence on scientific thought in the past, there are those who believe that Galton's influence will be more significant for the future. Of the two cousins Galton, by his interest in anthropometry, biometry and genetics, has certainly contributed more to foster scientific studies in education, and in a sense he must be looked upon as the patron saint of educational measurement. Educationists, therefore, will be especially interested in this monumental biography from the pen of the Director of the Galton Eugenics Laboratory. A large part of the first volume is naturally devoted to tracing the ancestry of Francis Galton, and pointing out the origin of those traits which characterize his later scientific activities. Probably in no biography extant are the hereditary factors so carefully and completely worked out, and, as many of these on the maternal side are common to the two cousins, the book forms an interesting contribution to the life of Charles Darwin as well. The account of Galton's early life, his school days, his experiences as a sort of apprentice in the Birmingham hospital, his student life at Cambridge, and his explorations in South Africa are admirably portrayed, and the account is illuminated by liberal quotations from his letters. It is a book that should be found in every educational library.

LAURA SPENCER PORTOR. *Genevieve, a Story of French School Days*. New York: E. P. Dutton & Co., 1914. Pp. xxv, 327. \$1.25.

This number of the "Little Schoolmate Series" gives an entertaining account of boy and girl life in France. There are rambles about Paris, a trip to Marseilles, and much about Joan of Arc and other characters in French history.

Proceedings of a Conference on Educational Measurements. Indiana University Bulletin, Vol. XII, September, 1914. Pp. 170. 50 cents.

This conference was held at Indiana University, April 17 and 18, 1914. The bulletin reports in detail both the formal papers and the discussions which ensued. Among the topics presented we note: "Means of increasing efficiency in arithmetic," "Giving of tests in reading," "Individual differences and their causes" and "Units and scales for measuring educational products," all by Professor E. L. Thorndike; "Results of Binet tests," by Professor E. E. Jones; "Organization of school surveys," by Superintendent H. L. Smith; "Use of Courtis tests," by Mary Kerr; "Elementary teachers and co-operative research," by Professor M. E. Haggerty, and a round table, led by Dr. W. F. Book, on "What the University can do for the elementary and secondary schools of Indiana." The bulletin contains a good deal of valuable material; that dealing with recently-developed plans for testing reading ought especially to prove timely to many of our readers.

W. H. PYLE. *Abnormal and Defective Children*. Columbia, Mo.: University of Missouri Bulletin, Vol. XV, No. 28, October, 1914. Pp. 10.

A bulletin on the care and training of abnormal and defective children for the benefit of those who come in contact with such children in the schools, and who are interested in the formation of special classes for them. There is a paragraph on the treatment of supernormal children.

CASPER L. REDFIELD. *Dynamic Evolution. A Study of the Causes of Evolution and Degeneracy*. New York: G. P. Putnam's Sons, 1914. Pp. xi, 210. \$1.50 net.

"This book deals with those characteristics which make one animal superior to another in the struggle for existence. The writer formulates a theory of animal energy, the process by which it is increased or diminished from generation to generation, and the manner in which it is transmitted. This theory he substantiates by statistics drawn from the pedigrees of horses, cattle, dogs and men."

Report of the Commission on National Aid to Vocational Education.
Volume I. Washington: Government Printing Office, 1914.
Pp. 207.

This important document presents the detailed reports on the basis of which the recently-enacted Smith-Lever law was formulated.

BERTRAND RUSSELL. *Our Knowledge of the External World as a Field for Scientific Method in Philosophy.* Chicago: The Open Court Publishing Co., 1914. Pp. vii, 245. \$2.00.

The author, who is well known for his contributions to mathematical logic, endeavors to indicate the principles upon which philosophy may become scientific instead of remaining in the sphere of the mystically imaginative, as do the philosophical systems of the past. After a survey of current philosophical tendencies and a discussion of logic as the essence of philosophy, the author devotes himself to an analysis of our knowledge of the external world, points out the difference between the world of sense and the world of physics, and shows that the whole conception of the world of physics is a construction rather than an inference. There are further chapters on the theory of continuity, the problems of infinity and the notion of cause.

LEVI SEELY. *History of Education.* Revised Edition. Cincinnati: The American Book Co., 1914. Pp. 349.

This book is "designed to furnish all the material that can be reasonably demanded for any state, county or city teacher's certificate"; but, while it may accomplish this purpose fairly well, the treatment of the subject is so sketchy that students can scarcely obtain a fair idea of educational development.

JOSEPH S. TAYLOR, Editor. *Reply of the Association of District Superintendents of New York to Certain Findings and Recommendations of Professor Frank M. McMurry and Professor Edward C. Elliott.* New York: Published by a Committee of the Association, 1914. Pp. 116. 50 cents.

If the Hanus School Inquiry Commission has had no other effect, it has at least stimulated the teaching force of New York city to analyze the conditions of their service, and to give some justification to themselves and to others for their existence. Perhaps the fostering of the critical attitude toward one's work is the most valuable outcome of any investigation.

WINIFRED LOUISE TAYLOR. *The Man Behind the Bars*. New York: Charles Scribner's Sons, 1914. Pp. viii, 302. \$1.50 net.

A simple and touching narrative of experiences with convicts ranging over a period of twenty-five years. One cannot read this book and suppress a shudder at the crimes against human nature that are committed in the name of justice. The author says: "I have no wish to see our prisons abolished; but thousands of individuals and millions of dollars have been sacrificed to wrong methods of punishment; and if we aim to reform our criminals we must first reform our methods of dealing with them, from the police court to the penitentiary." Happily, there are signs that the public is beginning to realize that it is not only humanitarian, but economical, to emphasize the educational rather than the punitive treatment of criminals.

CORNELIA CARHART WARD. *Oral Composition*. New York: The Macmillan Company, 1914. Pp. xii, 412. \$1.00.

An attempt to set forth the essentials of oral composition in the high school, and to present an outline that will be helpful to both teachers and pupils. The book is in three parts: Part I deals with the conditions of good speaking, including preparation of material, paragraph and sentence formation, and the use of the voice in speaking; part II, with the four traditional types of writing and speaking, narration, description, exposition and argumentation, and part III with topics and illustrative material.

JOHN B. WATSON. *Behavior: An Introduction to Comparative Psychology*. New York: Henry Holt & Co., 1914. Pp. xii, 439.

Not only comparative psychologists, but psychologists of all descriptions, will be interested in this systematic exposition of the principles of behaviorism by its best known advocate. No more strikingly radical psychological treatise has appeared in years, and it is probable that the positions taken will be storm centers or platforms for reform campaigns for some time to come. At the outset the author charges that human psychology has failed to make good its claim as a natural science, that by its insistence upon the method of introspection it has introduced a mystical and uncontrollable element that precludes a strictly scientific procedure. "Psychology, as the behaviorist views it, is a purely objective, experimental branch of natural science which needs introspection as little as do the sciences of chemistry and physics." Human behavior should be treated on precisely the same plane and studied under the same conditions and by the same methods as animal behavior. This does not exclude the consideration of language as a type of response, for human responses have become so abbreviated and so highly symbolic that the linguistic element constitutes one of the chief factors in

behavior. The problems of both human and animal behavior are classified under four heads: (1) Sense organ functions. (2) Instinctive functions. (3) Habit formation. (4) Correlation: (a) among behavior data; (b) of behavior with structure, and (c) of behavior and structure with physico-chemical processes. There follow acutely reasoned discussions of instincts and habit formation, the abridgment of the learning process, the limits of training in animals, language habits as the characteristic differentiation of man from brute, and a detailed examination of the results of experiments in various sense fields. It is a stimulating and thought provoking book.

H. H. WEBSTER AND FANNIE E. COE. *Tales and Verse from Sir Walter Scott*. Cincinnati: The American Book Co., 1914. Pp. 384.

Several extracts from accounts of Scott, his friends and his career, are followed by selections from his poems and novels, making a very attractive supplementary reader.

Webster's Elementary School Dictionary. Cincinnati: The American Book Co., 1914. Pp. xvi, 702.

This school dictionary is abridged from Webster's New International Dictionary, contains 45,000 entries and is richly illustrated. The terms are especially selected with reference to the best modern elementary school practice.

EVA WILKINS. *The Weaver's Children*. Cincinnati: The American Book Co., 1914. Pp. 208.

An interesting story of the home life, travels and experiences of a weaver's family in the second quarter of last century. Children from eight to ten will find it fascinating, and will learn from it a great deal about the life of that time.

W. H. WINCH. *Children's Perceptions. An Experimental Study of Observation and Report in School Children*. Educational Psychology Monographs, No. 12. Baltimore: Warwick & York, Inc., 1914. Pp. x, 245. \$1.50.

The training of the senses, the cultivation of the powers of observation, are phrases which are frequently heard nowadays not only from laymen, but from professional educators from Montessori to college presidents. But in the minds of the thoughtful this enthusiasm for sense-training raises the query, "To what extent and by what methods can observation be trained?" And this leads to the further reflection that only a beginning has yet been made in the effort to measure the child's powers of observation and thus obtain

a basis to attack the problem of training. It is to Professor Stern of Breslau that the credit is due of first attempting to study scientifically the observations of individuals, and Mr. Winch has not only employed the same methods, but some of the same material in his study of the observations of English school children. Eight series of experiments were conducted in different schools with boys and girls of different ages and grades, and the results are tabulated in detail with reference to the perception of clothes, position, activities, things, number, color, and to the development of the perceptual attitude. The monograph is a painstaking study of the conditions which lie at the very basis of children's observations, and constitutes a valuable contribution to educational psychology.

FLORENCE HULL WINTERBURN. *The Mother in Education*. New York: McBride, Nast & Co., 1914. Pp. xiv, 337. \$1.50 net.

The author firmly believes that well begun is half done in education, and that with the proper home training school education can be shortened by several years. Hence the responsibility that rests upon the mother for the early education of her children. It is for the purpose of suggesting helps to the mother that this book was written, and there are interesting and ingenious suggestions for training in the use of the mother tongue, observation, nature studies, form, size, number, reading, drawing, foreign languages, travel and artistic appreciation. While making no pretensions to psychologic lore, the book is full of shrewd observations and helpful hints.

ROBERT M. YERKES AND DANIEL W. LARUE. *Outline of a Study of the Self*. Second revised edition. Cambridge, Mass.: Harvard University Press, 1914. Pp. 24.

The first edition of this outline was issued last year, and it is gratifying to note that a second edition has been brought out so soon. In their experience as teachers of psychology the authors have found it a valuable exercise for students to make as complete and detailed an analysis of their own personalities as possible, and it was to facilitate this analysis that the outline was prepared. The self is to be studied from four points of view: (1) As a product of heredity, for which purpose use is made of the "Record of Family Traits," issued by the Eugenics Record Office. (2) As a developing, reacting mechanism, taking account of the conditions of prenatal life, and the self in infancy, in childhood and adolescence. (3) As a self-conscious willing being, including both physical equipment and mental characteristics. (4) As a member of social groups, involving vocational, marital and social relationships. The record calls for such a complete and searching confessional that many people would feel hesitancy about filling it out, even though it is to be kept strictly confidential.

THE JOURNAL OF EDUCATIONAL PSYCHOLOGY

A SIMPLIFIED METHOD OF CONDUCTING McDOUGALL'S SPOT-PATTERN TEST.

MABEL GOUDGE.

(Studies from the Cornell Educational Laboratory, No. 20.)

SUMMARY.

The problem was to determine whether the rather complicated method developed by McDougall and used by other English investigators for conducting the spot-pattern test (series of five very short exposures, delivered by interrupting transmitted light at stated intervals) could be replaced with no loss in diagnostic value by a simpler method (single exposures with an ordinary tachistoscope and reflected light).

The quantitative results demonstrate that these two methods are interchangeable so far as rank-order of the subjects is concerned. The qualitative results reveal no marked or constant differences between the mental processes operative under the two sets of conditions.

The conclusion is reached that this test, which appears to have fairly high correlations with general intelligence, may be conducted by a much simpler method than that employed by its originator, and with no loss to its diagnostic value. No claim is made, however, that these results for adults will necessarily hold true in work with children.

THE PROBLEM.

The "spot-pattern test," first proposed by McDougall (3), and subsequently employed by Burt (1), Burt and Moore (2), and Schuster (4), warrants special attention because of the high correlations found between performance in it and estimated general intelligence. But the technique and apparatus which these English investigators have developed for the test renders it unduly difficult of administration, and tends to re-

duce the reliability of the results obtained by it. The following description by Burt (pp. 150ff.) will serve to describe the test and to explain this technique.¹

"A card 10 cm. square is pierced with eight or ten holes, each 1 mm. in diam. These perforations form an irregular pattern within an area 1.5 in. square, but always coincide with the intersections of any imaginary system of vertical and horizontal lines $\frac{1}{4}$ in. apart. One face of the card is now covered with clear, dead-white paper and the whole card is placed in an aperture of a screen in the path of a beam of light to *S*'s eye. By means of a photographic shutter the light is flashed upon the card in groups of 5 flashes, each lasting 20 σ , and at the rate of one every 2 sec. After each series of 5 flashes, *S* is asked to make a map of the spots of light upon a bit of squared paper 1.5 in. in size, ruled to correspond to the system of lines above mentioned, *i. e.*, in $\frac{1}{4}$ in. squares. He is told the number of spots and that each spot must fall at the intersection of two lines. He attempts a new map after each 5 flashes, until he makes an accurate reproduction."

The spot-pattern test is evidently a variation of the ordinary tachistoscopic tests for range or scope of attention, but with a much more complex method. The problem that we undertook to solve by experimentation was: would equally reliable diagnostic values be secured if the spot-patterns were displayed in an ordinary tachistoscope, *i. e.*, with a single exposure instead of a series of exposures, with relatively long instead of relatively short exposures, and illumined by reflected instead of transmitted light? To answer these questions it was planned to compare the quantitative results secured under both methods and to secure introspective accounts of the mental processes involved in them.

SUBJECTS.

The experiments were performed in the Educational Laboratory at Cornell University during the second semesters of the academic years 1911-12 and 1912-13. The subjects were Dr. Day (*D*), Messrs. Dallenbach (*Da*) and Johnstone (*J*), graduate students in psychology, Mr. Foster (*F*), research assistant in psychology, and Mr. Ruckmich (*R*), instructor in psychology. They were highly-trained observers, especially *D* and *F*. Besides these, two undergraduates, Messrs. Goldstone (*G*) and Machatt (*M*), who were doing work in education, were subjects in the experiments for the quantitative results.

¹For further description see Whipple (5).

APPARATUS.

We needed two pieces of apparatus for the experiment, the one to reproduce McDougall's conditions, the other to fulfill the requirements of the longer exposure time.

The one apparatus, then, was so devised as to reproduce in all essentials the experimental conditions of the portable tachistoscope used by McDougall. In a vertical screen of white cardboard an opening 4.7 cm. square was cut at a height such that it would be on the level with the subject's eyes when seated in front of the apparatus. Around three sides of this opening were pasted strips of cardboard, to form a frame for holding the exposure-cards. The illumination of the cards was given by a 16 candle-power frosted incandescent lamp, fitted with a semi-circular cardboard reflector, and mounted about 12 cm. directly back of the opening. A simple telegraph key, introduced into the lamp-circuit, enabled *E* to close or open the circuit at will. Instead of the photographic shutter used by Burt and McDougall, we used a revolving cardboard disc to make the series of exposures. With the aid of a kymograph this disc, 45 cm. in diameter, was rotated vertically just behind the screen. A notch of 10 deg. was cut at one point of the disc, and the speed of the kymograph was so regulated as to give exposures of 0.04 sec., at intervals of 1.5 sec., when this open notch passed between the lamp and the exposure-card.

The other apparatus was a laboratory-made model of Whipple's disc tachistoscope (5, 264ff.). The two pieces of apparatus were then both disc tachistoscopes. They were as alike as could be, except for the conditions under comparison, viz., transmitted versus reflected light and short serial versus long single exposures.

For convenience, the McDougall apparatus will be referred to as Apparatus T (transmitted light), and the other as Apparatus R (reflected light).

The exposure-cards for Apparatus R were virtually identical in pattern with those of Apparatus T, only here the dots were ink-dots, because the cards were to be illumined by reflected light. Daylight illumination was reduced to a negligible amount by black window curtains, and the room was artificially lighted by electricity.

PROCEDURE.

Experimental Series I. In this series there were three sets of patterns, one of 8-spot, one of 9-spot and one of 10-spot cards for each apparatus. Each set contained 20 patterns. The patterns for Apparatus R were the same as those for Apparatus T. And, further, the second half of the 8-, 9- and 10-spot patterns were the same as the first half, only turned around at an angle of 180 deg.²

Now, obviously, a subject could not have the same patterns for Apparatus R as for Apparatus T and, yet, different patterns could not be used with the two pieces of apparatus, because it would then be impossible to get a reliable basis for the quantitative and qualitative comparisons. To fulfill this condition, therefore, we divided our subjects into groups.

Group I (comprising *D*, *Da* and *G*) were given the first half of the three sets of patterns devised for Apparatus T, and also these same patterns, turned at an angle of 180 deg., devised for Apparatus R.

Group II (*J*, *M* and *R*) were given the remaining patterns. Each group thus worked through three sets, which contained half the number of patterns contained in the three full sets. In this way the patterns which were presented to Group I in Apparatus T were given to Group II in Apparatus R; and those presented to Group I in Apparatus R were given to Group II in Apparatus T.

Practice effects were distributed by changing the subjects from one apparatus to the other after each step in the experiment, *i. e.*, as soon as the pattern had been correctly reproduced. Group I began the series of experiments with Apparatus T and Group II with Apparatus R.

S sat at such a distance from the apparatus that his eyes were 45 cm. from the exposure-card, and in such a position that his

²It was necessary to make use of some plan of this kind, because the area of the pattern was so limited that it would have been impossible to make 20 different patterns with each given number of spots and have them all of sufficient difficulty. It may be mentioned that no subject noticed that any given pattern had been presented before at a different angle. Once or twice only a subject thought that he had had the pattern before, but in these cases it happened that he was mistaken.

eyes were fairly on a level with it. He was given a "ready" signal 1.5 sec. before the exposure. Prepared sectional paper on which to reproduce the design was placed before him. These squares of sectional paper were laid off at one side as fast as they were used, but they were not concealed from *S*'s view.³

The general purpose of the problem was known to the subject, and specific instructions were also given to him. For Apparatus T: "There will be a 'ready' signal, and shortly afterwards you will see a pattern of 8 spots [or 9 or 10 spots] lighted up by transmitted light for a fraction of a second, five times in succession. You are then to reproduce the pattern on this prepared sectional paper. The pattern is such that the whole design will fall within a large single square of the paper. The large square contains 36 small ones, and each spot will fall at the corner of a small square. If you fail to reproduce the pattern correctly the first time, the exposure will be repeated until you are successful."

The same instructions were given for Apparatus R, with the substitution of "reflected light for a brief period" for "transmitted light for a fraction of a second, five times in succession." Those subjects who also reported upon the qualitative aspects of the work were given appropriate directions for that.

Experimental Series II. Another set of experiments consisting of two sets of patterns—9-spot and 10-spot patterns—was carried out with Apparatus T for some subjects (*Da, F, J, R*). This series was very short.

McDougall at first allowed his subjects to try to reproduce the pattern after each exposure, but this was found confusing

³It is not clear whether McDougall, Burt and Schuster permitted their subjects to keep their several attempts at reproduction in view. The instructions set for the test in my *Manual of Mental and Physical Tests* and ordinarily followed in the Cornell Laboratory are to conceal these attempts as soon as they are made. It was intended that this procedure should also be followed in the present experiment, but Miss Goudge, who did most of her experimental work during my absence in Europe, interpreted Burt's instructions to indicate that the attempts need not be concealed. It is impossible to say just what effect this change in method may have had other than to have reduced the number of exposures necessary for a perfect reproduction. In any event, whatever effect was present was a constant factor in both the methods under comparison.—G. M. W.

to them, and he concluded that a short series of exposures was better. As finally developed, then, his method called for an attempt at reproduction after every group of five flashes. The intervals between the exposures in the groups were equal, and in this way a better control of the mental processes was thought to be attained. Each of the short exposures represent for McDougall a quantitative unit, and it is in the terms of them that the subject is scored. Now, it seemed to us that if the flashes were such units, their full value as units would be diminished by giving the subject a chance to draw the pattern correctly from five flashes only. For example, suppose the subject reproduced the given design correctly after three trials of five flashes each, his score would be recorded as 15 units. Now, it is really quite conceivable that his score was somewhere between 10 and 15 units. With this in mind, we carried out three experiments after each set, wherein the subject was asked for a reproduction after each flash. These patterns were obtained by turning some of our earlier patterns at an angle of 90 deg. No subject recognized a previous pattern. Introspections were required after each trial.

QUANTITATIVE RESULTS.

Experimental Series I. A glance at Table I shows that all the subjects reproduced the 8-spot patterns correctly with fewer repetitions in the case of Apparatus R than in the case of Apparatus T. Tables II and III show the same for the 9- and 10-spot patterns.

TABLE I.

*Mean Number of Exposures Necessary for a Correct Reproduction.**

(8-Spot Patterns.)

Subjects.	Apparatus T.	Apparatus R.
Da.	8.5	2.0
D.	12.5	4.7
G.	21.0	8.5
J.	19.5	5.4
M.	22.5	4.4
R.	13.5	3.3

*Scores for Apparatus T in all three tables are based on the single flash as a unit, *e. g.*, a score of 10 means two exposures of 5 flashes each.

TABLE II.

*Mean Number of Exposures Necessary for a Correct Reproduction.**(9-Spot Patterns.)*

Subjects.	Apparatus T.	Apparatus R.
Da.	5.5	1.3
D.	9.5	2.6
G.	23.0	6.5
J.	20.0	5.4
M.	16.5	3.7
R.	9.5	2.6

TABLE III.

*Mean Number of Exposures Necessary for a Correct Reproduction.**(10-Spot Patterns.)*

Da.	9.0	1.9
D.	9.0	2.4
G.	20.5	5.1
J.	16.0	2.9
M.	13.5	3.2
R.	15.0	2.7

Obviously, these results as they stand show nothing either for or against using Apparatus R as a substitute for Apparatus T in the spot-pattern test. They simply show that under the conditions used a single exposure of 1.5 sec. is not as effective as a *group of five* exposures of .04 sec. each. But, if we now arrange the subjects in order of rank for Apparatus T and again for Apparatus R, and if we find that the rank-order of R corresponds with that of T, then we shall have strong evidence that the one apparatus can be as satisfactorily used for the test as the other. The result of such treatment is shown in Table IV, where we see that, with five

TABLE IV.

Subjects Arranged According to Rank.⁵

Subjects.	8-Spot Patterns.		9-Spot Patterns.		10-Spot Patterns.	
	App. T.	App. R.	App. T.	App. R.	App. T.	App. R.
G.	210	85	230	65	205	51
M.	225*	74	165*	37*	135*	32
J.	195	54	200	54	160	29
R.	135	33*	95	26	150	27
D.	125	47	95	26	90	24
Da.	85	20	55	13	90	19

⁵The asterisks show the exceptions to the order. The means in the previous tables are here multiplied by 10.

exceptions, the same rank-order holds for all the conditions. This alone would seem a sufficiently close approximation to warrant the use of either apparatus for the test. At the same time, in order to obtain further evidence of our conclusion, the coefficients of the correlation between the mean-values obtained with Apparatus T and those with Apparatus R for the three sets of patterns were next worked out by means of the Pearson formula. From the results shown in Table V we see that all three sets of patterns give a high positive coefficient—especially the 9-spot patterns, which give a coefficient of .99. These coefficients have also a high degree of reliability, as the values for the probable error show. We are, then,

TABLE V.

Correlations Between Performances^a with Apparatus T and Apparatus R.

Pattern-Sets.	Correlation.	P. E.
8-Spot Patterns.....	.92	.042
9-Spot Patterns.....	.99	.008
10-Spot Patterns.....	.87	.069

fully justified in assigning equal diagnostic value to both methods of conducting the test, at least for adult S's.

Experimental Series II. Our results from these experiments show that in over 70 per cent. of the experiments the subjects reproduced the presented pattern correctly in less than five actual exposures, while in the remaining experiments the reproduction was made in less than 10 trials—only once in exactly five trials (see Table VI).⁷

TABLE VI.

Results for Experimental Series II.

Pattern.	9-Spot Patterns.				10-Spot Patterns.		
	D.	J.	R.	D.	J.	F.	R.
I.....	3	6	8	1	2	4	4
II.....	2	6	2	3	6	2	4
III.....	2	5	2	1	7	3	2
Mean.....	2.5	5.7	4	1.6	5	3	3.3

^aSee Tables I-III.

⁷One subject (*Da*), near the beginning of the experiments with the 8-spot patterns, said that he was sure that he could get a correct copy more easily by one flash than by a group of five. Accordingly, we made our one deviation in our procedure, giving him an 8-spot pattern, which did not form a part of the regular set, and he did really reproduce this correctly in one flash as he had predicted.

QUALITATIVE RESULTS.

In order to gain all the information possible concerning the two methods the quantitative results have been supplemented by quite detailed and systematic introspective reports from our most competent *S*'s concerning the mental processes operative under both methods during the period from the "ready" signal to the exposure, during the period of the exposure and during the period after the exposure while the pattern was being reproduced.

Despite certain individual differences, such as would be quite natural, the introspective accounts exhibit so much similarity that a general summary for all *S*'s will suffice for the purposes of this report. The important point is that there is not only a general similarity between the introspections of the several *S*'s, but also between the introspections for the two different methods. The qualitative records, then, reveal no reason why the simpler method of single exposures by reflected light may not be substituted for the original and more awkward method used by McDougall, Burt and others in England.

The following are the main points of similarity in regard to the mental processes concerned in the learning and the reproduction:

(1) During the exposures the subjects invariably arranged the dots subjectively into groups. Attention was now on one group, or figure, and now on another. In experiments with Apparatus T it is usually remained on one group during the flash-like exposure, and the shift of attention, accompanied by eye-kinaesthesia, occurred in the intervals between the exposures. Notwithstanding the difference in conditions, a very similar method was followed with Apparatus R. There, too, attention would shift from group (or figure) to group. The five momentary exposures with the intervals between them used with Apparatus T, therefore, form practically one long exposure, and may be likened to the exposure with Apparatus R.

(2) There was frequently verbal kinaesthesia relevant to the grouping in the mid-period also.

(3) Three subjects (*D*, *Da*, *F*) mentioned an after-image

of the preceding figure (or figures) during the intervals between the momentary exposures of Apparatus T.

(4) The following factors were usually present in the reproduction: (a) visual imagery, (b) verbal kinaesthesia (*J* excepted), (c) eye-kinaesthesia (*D* and *R* excepted).

When our *S*'s were asked to make direct comparisons of the mental processes set up by the two methods, their testimony showed again that the method of learning and reproduction is, in the main, the same for both kinds of apparatus. The following include the essential, though minor, differences reported:

(1) The "dots were more intensive" in the case of Apparatus T (*Da*).

(2) They make greater claim on the attention (*F*, *J*).

(3) The successive acts of attention are objectively separated in Apparatus T, "whereas, in the other experiments, one has to do one's own separating of these during the exposure itself" (*F*).⁸

(4) *F* experiences exceptionally strong strain sensations throughout the experiment with Apparatus T, while the reverse is true for *J*.

(5) *R* usually finds work with Apparatus T unpleasant, due to three factors: (a) noise of the motor, (b) "cutting off of initiation of eye-movement," (c) translating the bright dots on the darkish background (during the learning) to black dots on a white ground (in their reproduction). *F*'s statement, twice made, that "the interval" (referring to the momentary exposures) "is for consciousness practically a

⁸We understand that McDougall favored a brief exposure, partly to stimulate attention, and partly to render the attitude of various *S*'s toward the task more nearly alike, and that five brief exposures were used instead of one in order to shorten the time of the whole experiment and not to let attempts at reproduction interfere with the development of the perception before it was fairly well begun. *F*'s introspection is the only bit of evidence revealed during our experiments that might be construed as partially justifying McDougall's experimental technique, since it suggests that a series of objectively distinct brief exposures tends to regulate and distribute the several acts of attention given to the pattern by *S*. Not enough tests were made with *F* to determine whether the introspective distinction which he made would be paralleled by a discrepancy between his quantitative performances with the two methods.

part of the whole period," substantiates our inference given above.

The essential introspective features brought out by Experimental Series II are:

(1) During the exposure attention was usually focused on one group only; but, sometimes, on two, just as in the momentary exposure with Apparatus T.

(2) *Da* and *F*, who were accustomed to have after-images in the interims between flashes in Apparatus T, Series I, got after-images here also, directly after the exposure, and used this time, during which these images were present, as if it were part of the real exposure time, *i. e.*, they used it for learning the pattern.

(3) All *S*'s used visual imagery in the reproduction. *Da* and *F* often had kinaesthetic cues as well, and *G* sometimes drew the figure quite automatically.

SUMMARY OF MAIN RESULTS.

(1) In Experimental Series I the ranking of the subjects for the experiments with Apparatus T is, with a few exceptions, the same as that in the experiments with Apparatus R, so that there is a high positive correlation between the values obtained with Apparatus T and Apparatus R.

(2) In Experimental Series II, with one exception, the subjects always produced the pattern correctly in a number of trials other than 5 or any multiple of 5.

(3) The subjects learned the patterns by grouping the dots.

(4) Usually a visual perception of one group only was attended to at once. In experiments with Apparatus T attention remained on a group during a momentary exposure and shifted between exposures. With Apparatus R there was a similar shift of attention during the mid-period, though this shift was not objectively regulated as with Apparatus T.

(5) Other mental processes, chiefly kinaesthesia (naming groups or figures), accompanied the perception of the groups and formed part of the learning processes.

(6) The following factors played an important rôle in the

reproduction—visual imagery, eye-kinaesthesia (and hand-kinaesthesia for *F*), verbal kinaesthesia.

(7) In Experimental Series II the mental processes concerned in learning a pattern were quite the same as in Series I, except that the mid-period here gave no chance for a change of attention during the total exposure-time. Two of the subjects continued the learning after the momentary exposures by shifting attention to the memory after-image of the group just fixated. This additional period of learning would correspond fairly well with the intervals between exposures in Series I with Apparatus T, which were used in a similar way.

CONCLUSION.

All of our results seem to justify us in the use of Whipple's tachistoscope^{*} for McDougall's "spot-pattern" test. And, further, we are inclined to think that where the McDougall's portable tachistoscope is used for the test, a somewhat more accurate rating of the subject—at least with adults—can be obtained by giving him a chance to reproduce the pattern after each momentary exposure.

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^{*}Since the completion of these experiments Professor Whipple has devised a portable tachistoscope, which gives satisfactory results for the McDougall 'spot-pattern' test (5, 293 f.).

THE TRAINING OF JUDGMENT IN THE USE OF THE AYRES SCALE FOR HANDWRITING.

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(Contributions from the University of Texas Educational Laboratory, No. 6.)

INTRODUCTORY.

Judgment is a form of mental activity which plays an important part in the daily work of the teacher, but as yet educational psychology has scarcely begun the extensive investigations which are called for in this field. One small phase of the subject, the judgments shown in grading the work of pupils, has been studied to some extent, but the work done thus far has only dealt with results. No attempt has been made to study the mental processes involved in such judgments. The elements which enter into them, the criteria upon which they are based and the conditions which make for variability in them are problems which need careful consideration.

One factor which no doubt will help to reduce the variability of judgment in grading is the introduction of scales for measuring handwriting, composition, drawing and spelling. Nevertheless, it is desirable to have a careful analysis of the mental processes involved in their use and a determination of the conditions under which they give the most reliable results.

To study some phases of these mental processes and to test experimentally one plan for procuring better results in the use of scales is the general problem of the following investigation.

EXPERIMENTAL.

King and Johnson,¹ and Pintner² have called attention to the fact that there is considerable variability in results when more than one judge use a scale in grading samples of handwriting. Mr. Manuel of the University of Chicago in some unpublished results of an investigation in the use of the Ayres scale by students of education, writing supervisors and others comes to the rather discouraging conclusion that it is impossible to get reliable results in such work. The question raised and partially answered by this investigation has to do with the effect of a period of practice upon the variability in grading handwriting by means of the Ayres scale.

It is a notable fact that most of the work which has been done in grading has emphasized its unreliability, but no positive contributions for remedying this defect have been offered, except the use of the distribution curve. One type of judgment closely related to the grading of the teacher is the scoring done by agriculturists. Variability in this judging is reduced to a minimum by means of a long period of training in the use of score cards. This suggests that much of the grading done by the teacher may be of such nature that training will materially affect the results.

The experiment to be described was begun the second week of January, 1914, and continued for twenty weeks. The training was concluded at this time on account of the close of the university year. It is not intended to propose this length of time as a standard for such training. The results show that with this group of judges the training was not complete. However, it is the opinion of the author that with a better technique the same degree of expertness could be attained in a shorter period of training.

The judges who took part in the experiment were three

¹*The Writing Abilities of the Elementary and Grammar School Pupils of a City School System Measured by the Ayres Scale.* Journal of Educational Psychology, Vol. III, 514-520.

²*A Comparison of the Ayres and Thorndike Handwriting Scales.* Journal of Educational Psychology, November, 1914.

students³ of education who were selected because of their reliable class work. None of them had had any experience in the use of a scale or in other experimental work, but they entered into the spirit of the experiment and gave it their best efforts. They had had no experience in teaching, and so had no established habits of grading. It would be very interesting to know just what kinds of mental activities and temperaments lend themselves most readily to the type of training employed in this experiment. Evidently there are certain factors which make for progress which it would be well to know when such work is undertaken.

The samples of writing used were taken from the written work of both children and adults. None of the samples was prepared especially for the experiment, but all were taken from the written exercises in language, geography, etc. Twenty-five samples were used each week, and with two exceptions (see seventh and eighth weeks in Table 1) different samples were used each time. Table 1 shows the different types of writing used during the experiment.

TABLE 1.

Week.	Sample.
1.....	Adult writing.
2.....	Adult writing.
3.....	Third grade writing.
4.....	Fourth grade writing.
5.....	Third and fourth grades, and adult writing.
6.....	Second grade writing.
7.....	Same as third week.
8.....	Same as fourth week.
9.....	Seventh grade writing.
10.....	Fifth grade writing.
11.....	Second grade writing.
12.....	Fifth grade writing.
13.....	Sixth grade and adult writing.
14.....	Fifth grade writing.
15.....	First grade writing.
16.....	Third grade writing.
17.....	Fourth grade writing.
18.....	Third and fourth grade writing.
19.....	Second grade writing.
20.....	First grade writing.

At the close of the twentieth week five hundred additional

³The author is very much indebted to Miss Louise Garrison, Miss Pollie Hart and Miss Mary Andrews for the faithful work that has made this article possible.

samples were graded. These were collected, for the most part, from the elementary grades, but a few specimens from adults were included. With a few exceptions, these samples were written in the university laboratory at the direction of the author under careful supervision as a part of another experiment. In the subsequent discussion it will appear that the above fact seems to have materially affected the results of this experiment.

Little attention was given to the selection of the samples to be used each week, because it was thought that one sample was as good as another to give practice in the use of the scale. The results of the experiment show that this method of procedure is not desirable, for there were very few samples in the entire group which received high grades, and, therefore, the judges had little practice in the use of the upper portion of the scale. In the grades for the five hundred samples already mentioned the greatest variability is shown in those samples which are graded high. This is evidently due to the lack of practice in the use of the high values on the scale. The experience gained in conducting the experiment indicates that one of the most important things in the entire technique of such training is the selection of the writing used. A wide range of samples should be selected, so as to require the use of most of the grades on the scale each time that a number of samples is graded.

The preliminary directions consisted of a brief outline of the proposed experiment and a short discussion of the Ayres scale, with careful directions for its use. It was made plain to the judges that they could not only give those grades appearing on the scale, but if they thought a sample fell between samples given on the scale, they should give it an appropriate value or grade. They were also instructed to evaluate the style of each sample by using A, B or C as provided in the scale.

The general plan followed was to have each of three judges grade twenty-five samples of handwriting independently, and to follow this independent grading by a conference with the author each Friday for the purpose of comparing their grades and discussing their difficulties. Some of the notes on the

conferences are given below. The experiment was undertaken with the idea of determining the effect of the practice in an objective manner rather than by an analysis of the subjective process, and as a result few notes were kept, and the account given is somewhat meager. The results of the present experiment lead the author to think that a much more detailed account of the mental processes involved would be of value, and such work is planned for the future.

In the first conference the samples on which there was a large variation were considered. Such questions as, Is this sample peculiar in any way? Was it difficult to grade? Did you feel sure of your grade? were asked the judges. The point of value which came out of these considerations was that sometimes these samples were those upon which one or more of the judges had spent some time in deciding upon the grade. Further discussion will show the importance of this point. It might also be added that the consideration of these samples in the conferences usually failed to bring about any closer agreement on the grading.

At this first conference the judges were asked to grade themselves on the degree of certainty which they felt when they graded a sample. The following scale was used: (1) very sure, (2) sure, (3) slightly doubtful, (4) doubtful, (5) very doubtful, (6) do not know, a guess. The purpose in this was to see if a high degree of uncertainty accompanied lack of agreement in grades. It was thought that if such results were found, they might give a basis for future work, but no such agreement was discovered. Many times the degree of certainty was high for each judge when there was a high degree of variation. One interesting thing is that, while each judge began this part of the experiment by using 2, 3 and 4 for grading themselves, two of them soon began to use 1 and 2 most of the time, while the third judge seldom used 1. It may be added here that the results for the designation of the style by A, B and C resulted in much the same way, *i. e.*, no relation could be seen to exist between judgments on style and judgments on grades. Sometimes there was agreement in both grades and style, or maybe in style and not in grades, or possibly agreement in neither. As the experiment pro-

ceeded, however, the agreement in the grades on style became greater. Neither of these plans seemed to help reduce the variations in grading, and both were discontinued in the latter part of the experiment.

The results for the first week showed that one judge was grading lower than the other two. It was suggested that she be a little more liberal in her grades. The next week her grades were higher than those of the other judges. The fourth week this variation was reduced somewhat, and in the results for the tenth week the averages were very close together. At the end of the second week it was noted that when a specimen of writing fell between any two samples on the scale one judge arrived at her grade by subtracting a certain number of points from the grade above, while the other judges arrived at their grades by adding a certain number of points to the grade below; for instance, if all gave the grade 35 for some sample, the grade meant five better than 30 for two of them and five less than 40 for the remaining one. It was thought that this might be a source of variation, and the one was asked to make her method parallel that of the other two.

At the third conference one of the judges suggested a difference in samples which furnished a basis for most of the work in the future conferences. Briefly, this difference is that certain samples are such that the first general impression of them does not change or fluctuate, while other samples are such that the first judgment changes. The second impression may be that the sample is either better or worse than the first impression indicated. This second judgment would prevail for such samples, but the fluctuation in the judgment made the grading more difficult than in the case above. Still other samples were such that general impressions could not be relied upon, and a somewhat detailed examination was necessary.

An attempt was made to study these different types of samples by objective methods, but little progress was made, because a sample which belonged in one group for one judge might belong in another group for the others. A further analysis of the mental activity involved in the judgment of the different kinds of writing revealed that each sample was

evaluated by some of its elements, as slant, formation of letters, size, legibility, etc. That is, one or more of these elements stood out prominently in the mind of the judge and confirmed or changed the first general impression. This seems to indicate that, while the general impression is one of the chief things relied upon in such grading, this general impression must have some check in a more detailed study. With certain samples this confirmation comes immediately; in others, the first impression is changed, but the second is confirmed, while in still others there is a great deal of fluctuation before any confirmation comes, and sometimes there would be a lack of confirmation, which was shown by the judge saying, "I do not know what I think of that sample."

The next step in the process was to find a specimen on the scale which was most like the writing to be graded. This involved comparisons which, according to the introspections of the judges, required that they have in mind the general impressions of both the sample on the scale and the sample to be graded. The introspections also showed that the judges did not depend upon these general impressions alone, but that they also looked for details of slant, spacing, etc., *i. e.*, the likeness of the two samples was not fully established by means of the general impressions, but must be confirmed by certain details.

Again, there seemed to be three different types of writing. First, those for which the first comparison gave results satisfactory to the judge. Second, those for which two or three trials were necessary, and third, those for which many trials were required before the comparison gave a satisfactory result. In the last case the result was recorded many times as a guess. Practice increased very greatly the number of comparisons which gave satisfactory results on the first attempt. It may be added that the same difficulties in arriving at correct general impressions for the samples on the scale were encountered, as in the case of the writing to be graded. This made the constant use of the scale necessary at first, but as the experiment proceeded memory was more and more depended upon, until finally the printed copy of the scale was used only for reference. It was the opinion of the judges

that one of the principal points in the training was in becoming thoroughly familiar with the scale.

For the next step in the procedure the judges were asked to make out a list of the points which they were using to check their general impressions. There was great similarity in the three lists, and from them the following list was made and given to each judge:

Letter formation poor.

Execution poor.

Slant mixed.

Indistinct.

Letters separated.

Not neat.

Not on the line.

Too small.

Easy to read.

They were then asked to characterize each sample with some one of these terms and record this along with their grades. These results showed that they did not use the same points to confirm their general impressions. The lack of unanimity in these reports did not decrease, but the grades soon began to show less variation. This certainly indicates that the essential thing in the grading is not the particular points used for the confirmation of the general impression. A second thought shows that this is true, because if a sample is good, then correct spacing, neatness, etc., are likely to be highly correlated with it, and so the general impression may be confirmed by any one of several points. This leaves the general impression as one of the most important elements in the judging. This seems to be borne out by the fact that in a large majority of cases there was unanimity in the general impressions.

To summarize, there are three distinct mental steps in the evaluation of writing by a scale. First, the forming of a general impression of the writing to be graded. Second, the forming of a general impression of a sample on the scale, and third, the comparison of the writing on the scale with the writing to be graded. The training, then, is a twofold one, in that it aids in getting a correct general impression and in making accurate comparisons.

These two elements, general impression and comparison, which enter into the evaluation of a sample of writing by means of the scale correspond closely to the results obtained by Hollingsworth.⁴ Further work with respect to the same points should be undertaken in order to give a detailed account of the effect of practice upon both of them.

NUMERICAL RESULTS.

Table 2 gives the grades for the first, tenth and twentieth weeks. The digits at the left indicate the number of the sample, while the letters at the top designate the judges.

TABLE 2.

First Week.				Tenth Week.				Twentieth Week.			
	A.	H.	G.		A.	H.	G.		A.	H.	G.
1....	48	30	30	1....	50	65	65	1....	40	40	37
2....	23	30	70	2....	42	40	47	2....	40	43	37
3....	58	60	70	3....	57	80	73	3....	37	37	37
4....	53	80	35	4....	43	57	43	4....	35	35	35
5....	20	35	48	5....	40	35	43	5....	37	30	37
6....	30	75	30	6....	40	35	33	6....	40	35	35
7....	30	35	60	7....	43	37	56	7....	40	40	37
8....	55	40	50	8....	45	33	37	8....	37	35	33
9....	50	40	60	9....	43	35	47	9....	35	35	37
10....	45	40	40	10....	45	35	37	10....	37	35	37
11....	35	25	40	11....	60	57	59	11....	37	33	35
12....	40	35	40	12....	57	57	47	12....	37	37	37
13....	60	70	50	13....	43	37	47	13....	40	33	35
14....	50	50	50	14....	67	80	83	14....	37	40	35
15....	43	60	60	15....	45	37	40	15....	40	40	37
16....	44	80	77	16....	47	35	57	16....	37	37	35
17....	30	35	60	17....	50	35	33	17....	37	40	35
18....	45	60	60	18....	47	77	67	18....	37	35	35
19....	50	75	58	19....	40	40	37	19....	40	35	37
20....	50	60	68	20....	40	45	57	20....	35	37	35
21....	25	35	40	21....	54	43	40	21....	37	33	37
22....	60	78	60	22....	43	35	47	22....	37	35	35
23....	35	40	35	23....	54	80	67	23....	37	43	40
24....	58	45	45	24....	43	43	53	24....	37	35	37
25....	60	75	70	25....	40	40	43	25....	40	40	40
Av. 43.8 51.5 52.2				Av. 47.1 47.7 50.3				Av. 37.7 36.7 36.2			

To show the variability in a more convenient form, the range of the grades for each sample was calculated. As the

⁴*Experimental Studies in Judgment.* Archives of Psychology, No. 29, December, 1913, chapter 7.

term range is here used it means the difference between the highest and the lowest grade given for the same sample. To illustrate: The highest grade for sample one in the first week above is 48, and the lowest grade is 30. The range is found by taking the difference between these two. Table 3 gives the range for each sample for the first, fifth, tenth, fifteenth and twentieth weeks.

TABLE 3.

	1st Week.	5th Week.	10th Week.	15th Week.	20th Week.
1.....	18	7	15	2	3
2.....	47	3	7	4	6
3.....	12	10	23	2	0
4.....	45	10	14	2	0
5.....	28	7	8	2	7
6.....	45	10	7	3	5
7.....	30	8	19	0	3
8.....	15	13	12	1	4
9.....	20	7	12	0	2
10.....	5	10	10	7	2
11.....	15	15	3	5	4
12.....	5	10	10	2	0
13.....	20	37	10	7	7
14.....	0	5	16	5	5
15.....	17	2	8	1	3
16.....	36	24	22	2	2
17.....	30	17	17	9	5
18.....	15	7	30	1	2
19.....	25	30	3	11	5
20.....	18	15	17	5	2
21.....	15	8	14	8	4
22.....	18	16	12	3	2
23.....	5	10	26	7	6
24.....	13	5	10	3	2
25.....	15	33	13	0	0
Average.....	20.4	12.7	13.5	3.6	3.2

At the end of the twentieth week the five hundred samples mentioned before were graded. This grading was done at two sittings, and, while the samples were graded carefully, the work was carried on under some pressure and not without the element of fatigue entering into it. In fact, it was hoped that the same conditions might prevail here as would exist where experts were grading a large number of samples in an elaborate study of handwriting. Table 4 gives results for two half grades.

In table 2 attention is called to the fact that for the first week there is a rather high variation in the average grades

TABLE 4.

Sample.	G A Boys.				Sample.	G A Girls.			
	A.	G.	H.	Range.		A.	G.	H.	Range.
1.....	37	33	33	4	1.....	35	37	37	2
2.....	37	30	30	7	2.....	37	33	35	4
3.....	37	53	40	16	3.....	25	35	33	10
4.....	35	37	33	4	4.....	27	37	37	10
5.....	37	37	37	0	5.....	25	30	33	8
6.....	33	40	43	10	6.....	33	33	35	2
7.....	33	33	35	2	7.....	30	33	33	3
8.....	35	37	37	2	8.....	35	33	40	7
9.....	33	37	40	7	9.....	35	35	33	2
10.....	31	40	37	9	10.....	37	37	35	2
11.....	37	40	37	3	11.....	33	40	45	12
12.....	27	33	35	8	12.....	30	35	30	5
13.....	37	37	40	3	13.....	37	35	37	2
14.....	40	37	35	5	14.....	37	37	37	0
15.....	37	37	37	0	15.....	40	35	40	5
16.....	27	35	30	8	16.....	27	35	30	8
17.....	27	35	33	8	17.....	35	35	35	0
18.....	35	30	35	5	18.....	37	35	37	2
19.....	35	35	33	2	19.....	37	35	30	7
20.....	35	35	40	5	20.....	35	37	33	4
21.....	43	37	43	6	21.....	43	35	37	8
Average...	34.6	36.5	36.3	5.3	Average...	33.8	35	35.3	4.9

given by the different judges. This variation is reduced very much in the results of both the tenth and twentieth weeks. Attention is also called to the fact that there is much less variation in the grades given for each sample in the results of the tenth week than in the results for the first week, and still less variation in the grades of the twentieth week. It may be argued that the absence of variation in the last results is due to the fact that there is little variation in quality, so that the grading is much easier. That it is not altogether due to this is shown by the fact that if the variation of the grades of the samples of the first week for which the grades run above 50 is calculated and the variation for those below 50 is also calculated, *i. e.*, calculating the variation for two groups varying equally in quality, the results show that the variation is nearly the same in each group, and each separate variation is about the same as the variation for the total group.

In the results for the tenth week the range in quality is only a little less than in the first week, and yet the variability of these grades is reduced about 50 per cent. (See Table 2.) The results for the five hundred samples mentioned before

range in quality from 20 to 80. This grading was all done at two sittings, and the samples were taken in a very miscellaneous order, yet the variation for most of the school grades is only a little higher than in the results for the latter weeks of the training period. Another interesting point is that the greatest variation occurred in the use of the high grades of the scale, where there had been little practice. If range in quality produces variation in grades, there ought to be as much variation among the low grades as in the high grades.

Table 4 also shows a small range in quality. This is typical of all the results from the five hundred samples except those for the adults. It was first thought that this might be due to some unknown factor in the practice, but further consideration showed that it was probably due to the samples of writing themselves. An examination of the samples for the twentieth week which were written by first-grade children shows that there is little difference in quality in the samples, and either they have been selected by the teacher or the class was not widely distributed in ability. When the five hundred samples are considered, the fact that there is wide range of quality (30-80) in the grades for the adults and only a comparatively small range of quality in the writing of the different school grades leads to the view that some factor has entered into the writing of the children which makes for uniformity in quality. Another fact which leads to the same view is that the range of quality for the different grades is from 29.6 to 36.4 for the boys and 28.5 to 38 for the girls. These results are very close to some of the grades given by King and Johnson. It is possible that the small range in quality is due to the fact that the children's writing was all done under controlled conditions, as mentioned before, while very few of the adult samples were so written.

CONCLUSIONS AND SUGGESTIONS.

1. Accuracy in grading writing by a scale may be produced by careful training in the use of the scale. In the past the assumption has been made that the ability to grade expertly in a subject came with an expert knowledge of the subject. While the experiment does not disprove this assumption, it indicates clearly that another avenue of approach to such

expert ability is through a period of careful training. This implies that grading may be considered a field more or less by itself, and gives a glimpse of a type of work in education whose chief interest is the accurate use of units of measurement. To illustrate: In the subject of writing such a field would have its chief interest in the expert application of standardized units for measuring writing rather than in the psychology or pedagogy of the subject.

2. The experiment suggests a field in which Normal Schools and Departments of Education may well afford to give training.

3. It is certainly within the range of possibility for any medium-sized system of schools to have within its teaching force a few teachers who have been carefully trained in the measurement of handwriting or other subjects. One objection made by teachers to grading by means of scales is that no two persons get the same results. One must admit that this objection has some merit, but grading by teachers trained until their range of variation has reached a minimum would certainly beget the respect of all concerned, and would give an excellent basis for the establishment of norms and comparisons of schools, grades and teachers. Such work would also establish many of the favorable and unfavorable points concerning a system of schools upon such a basis that there would be no denying them.

4. The objection may be offered that the whole scheme is impracticable because of the long period of training required. Two replies suggest themselves to this. First, the period of training in the experiment is not so long as that required in some agricultural courses. Second, it is quite possible that when a technique is worked out for the training period the length of the time for practice will be materially reduced.

For those who wish to attempt work of this kind the following suggestions in regard to technique are offered:

1. At the beginning of the experiment twenty-five samples should be used at each sitting. Two periods for each week, with a two days' interval between the grading, are probably better than a single period. The number of samples at each sitting may be increased as the time for grading is reduced.

2. The samples should be selected very carefully, so that each set requires the use of the entire compass of the scale.

3. The use of the scale should be carefully explained. The judges should be encouraged to make a detailed study of it, and to become so familiar with it that the printed copy need be used only for reference.

4. The elements of good writing, such as slant, spacing, etc., should be discussed with the judges and a list of these elements given to each.

5. The judges should be encouraged to depend upon the general impression of the sample in making their comparison with the scale.

6. Conferences should be held at least once a week for discussions of difficulties and comparisons of results.

7. If the person conducting the training is an expert in the use of the scale, he should check the results of the pupils in training with his own judgments. Such checking of results, supplemented by discussions of the errors made, would certainly be a decided advantage. It may be mentioned that in the training given in agricultural courses this is considered most important.

ARTICULATION AND ASSOCIATION.

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In performing tests or experiments on free or controlled association questions always arise concerning the relation between the reading and articulation time of an observer, on the one hand, and his association time as shown by the records, on the other. Thus observers frequently complain that their associations really come more quickly than the records show, but that their speech organs will not act quickly or rapidly enough to keep up with the associations. It is not only in free association that this happens, but it is also a common occurrence when the test is one of controlled association between stimulus word and response. In "opposites" tests, for example, observers quite uniformly assert that the proper words, when stimuli are presented in series, are delayed by the necessary slowness of articulation. There is a common feeling on the part of these observers that the opposites are given as rapidly as they could be read from a printed list.

Professor Whipple has remarked this tendency in his discussion of the speed of reading complicated prose (*Manual of Mental and Physical Tests*, 1st ed., p. 276). "Adults who try the test are almost unanimous in their declaration that their speed in reading is not conditioned by the task of assimilating the substance of the text, but solely by the physiological limit to intelligible articulation: their speed in reading the reversed text, however, is quite obviously not conditioned by speed of articulation, but by a sort of 'linguistic readiness,' or ease of apperceiving the constituent words of the text."

Another frequent assertion, when there is any competition between different observers, is that they differ only in reading and articulation time, and that their associations are equally prompt. Another statement often made is that women are

speedier in linguistic tests, and that perhaps this difference is due to more rapid reading and articulation.

On the first of these points Whipple, in the section already referred to, remarks, "If these statements are correct, we are evidently driven to the conclusion that persons who read difficult and complicated subject-matter rapidly also tend to speak more rapidly—a conclusion that subsidiary tests appear to confirm. It is, furthermore, not unlikely that fast readers are also fast thinkers as well as fast speakers, though this generalization has at present no experimental verification."

On the question of differences between men and women, Cohn and Dieffenbacher (*Beihefte Zeits. Angew. Psychol.*, 1911, 2, 50) report that in all the school grades tested in their research the female subjects read more rapidly than the males. Professor Whipple writes me that he has made the same observation, and that the new edition of his *Manual* is to contain a special comment on this point.

With these various things in mind, along with certain other questions, I have put 19 observers (11 men and 8 women) through 100 trials of the familiar Color Naming Test and the same number of trials of the Opposites test described in earlier articles. The observers were chosen at random from college or graduate students. The men were all actively engaged in scholastic or literary work, while five of the women had been keeping house for several years since their graduation from college. They ranged in age from 18 to 35 years.

The procedure was as follows: Each individual went through the tests 100 times, in periods varying from 10 to 40 days. The time of each trial was taken in fifth-seconds, with a stop-watch. After the 100 trials each individual was given a sheet on which was typewritten, in the case of the Color Naming Test, the names of the colors, in the order and arrangement in which the colors themselves had appeared on the chart; in the case of the Opposites test, the actual opposites which the individual had customarily given, arranged in the order in which they might have occurred in an actual test. He was allowed to read these lists aloud, as rapidly as possible, on five different occasions, and the reading and articulation time was recorded in fifth-seconds.

The original test records were now referred to, and for each observer two averages were found, hereafter designated *initial* and *final* average. The initial average is the average of the first five trials after a single preliminary trial. The final average is the average of the last five of the 100 trials.

With this material at hand light may be thrown on various of the foregoing questions. Table I gives the three records for each observer in both tests, and also the averages. The detailed problems will be taken up in turn, on the basis of special tables and computations derived from this main table.

1. *Correlation of Reading Rates.* With respect to individual differences in speed of reading aloud, the various observers are consistent in the two tests (Color Naming and Opposites). When the 19 individuals are arranged in order of relative position in the two cases there is a correlation of .93 between the two orders. It would, of course, be surprising if this were not so.

TABLE 1.
Reading-articulation and Association Times.*

Obs.	Color Naming.			Naming Opposites.		
	Reading Colors		Reading Color Names	Reading Opposites		Reading Words
	Initial.	Final.		Initial.	Final.	
M1	40.3	27.6	23.0	46.9	30.0	13.6
F1	44.8	27.0	20.9	63.8	24.7	13.6
F2	45.9	30.4	19.5	33.0	23.4	14.4
F3	60.6	39.6	28.4	143.0	33.1	16.5
F4	47.1	37.0	26.4	63.8	20.9	13.1
M2	55.0	39.0	26.7	70.9	32.0	13.5
M3	127.8	67.4	39.8	102.8	44.2	22.6
F5	65.2	58.6	29.4	122.8	36.0	17.4
M4	57.8	44.0	32.4	97.0	32.4	18.2
F6	62.6	35.2	29.0	70.4	25.2	18.4
M5	58.8	38.8	28.8	85.6	27.6	16.8
M6	85.6	51.8	32.4	148.4	45.0	18.4
M7	82.0	46.2	37.4	175.4	39.2	21.2
M8	105.4	65.6	42.0	112.6	48.0	21.6
F7	60.6	55.6	32.0	61.2	34.9	18.6
M9	54.8	42.2	31.0	83.8	32.2	18.5
M10	77.4	58.0	33.4	98.2	33.6	18.6
M11	100.4	57.8	38.2	357.2	35.0	20.2
F8	88.4	67.6	29.0	239.6	51.4	16.6
Averages.	69.7	48.9	30.5	107.7	34.1	17.5

*By "reading-articulation" or simply "articulation" time is meant the time required to read aloud the color names or the correct opposites when they are presented in printed form.

Correlations.

Two Articulation times.....	.93
Initial Colors and Articulation.....	.84
Final Colors and Articulation.....	.75
Initial Opposites and Articulation.....	.53
Final Opposites and Articulation.....	.64
Initial Colors and Opposites.....	.79
Final Colors and Opposites.....	.91

Average Times, Men and Women.

	—Articulation.—		—Colors.—		—Opposites.—	
	Colors.	Opposites.	Initial.	Final.	Initial.	Final.
Men	33.2	18.5	77.1	49.0	113.5	36.3
Women	26.8	16.1	59.4	43.9	99.7	31.2

Average Positions Occupied by Men and Women.

	—Articulation.—		—Color Naming.—		—Opposites.—	
	Colors.	Opposites.	Final.	Initial.	Final.	Initial.
Men	12.5	12.2	11.1	11.0	11.3	11.3
Women	6.5	7.0	8.4	8.6	8.3	8.1

2. *Reading Rate and Association Times.* There is fairly high correlation between the orders for reading rate and the orders for association time in the actual tests. This correlation is much higher in the case of Color Naming than in the case of Opposites. The average correlation between reading rate and initial time is exactly the same as the average correlation between reading rate and final time. The final average correlation between reading and association times is .69. The figures are as follows:

	Initial.	Final.	Average.
Reading color names and naming colors.....	.84	.75	.80
Reading words and naming opposites.....	.53	.64	.59
Averages.....	.69	.69	.69

These facts throw interesting light on the nature of the difficulties in the two tests. Articulation counts for more in Color Naming than in Opposites, and it is a matter of common observation that in the Color Naming test there is great difficulty in enunciating the intended words properly. If the card bears such colors as red, blue, black, green, yellow, such expressions as "brack", "rellow", "bleen", etc., are frequent. The body of the word may show by its correctness that the color is properly recognized, but various perseverations, in-

libitions and interferences seem to muddle the articulation. In the Opposites test such expressions are not at all frequent. The mistakes of enunciation take the form rather of repetition of the stimulus word or of a preceding or following stimulus word or opposite. The difficulty is apparently not so much in the process of articulation as in the associative mechanism itself.

3. There is a *fairly high correlation of ability* in the two association tests, and this correlation, as is always the case, is greater after practice than before. The initial correlation is .79. The final correlation is .91. This gives an average correlation of at least .85 between Color Naming and Opposites.

4. *Comparison of Reading Time with Association Time.* On the average, the association time, in the test, is about twice as long as the reading and articulation time, but in the Opposites test this relation is not found except when the final time is considered. The initial time here is some six times as long as the reading and articulation time. That is, even in the beginning the speed of naming colors shows closer approximation to the speed of reading color names than does the speed of naming opposites to the time of reading them. Both in initial and final trials the difference between association time and reading-articulation time is greater in Opposites than in Color Naming. The figures are as follows:

Averages of	Reading and Articulation.	Initial Assoc.	Final Assoc.
Colors	30.5 sec.	69.7	48.9
Opposites	17.5	107.7	34.1

5. *Association Time Not Solely Conditioned by Articulation and Reading Time.* It is apparent, since the association times do not at all approach the limits set by articulation-reading time, that a considerable time is required for the associative mechanism itself. Since there is, on the average, only 70 per cent. correlation between reading-articulation and association times, it follows that individuals differ markedly in the speed of the associative mechanism itself. No individual fails to show a large difference between test time and reading time. Nor would they so fail if allowed to practice longer.

As I have elsewhere shown, the practice limit in Color Naming is reached by about the tenth trial, and in Opposites by about the seventy-fifth trial. The present experiment, it will be remembered, included 100 trials. It is furthermore true that the two tests show higher correlation with each other than they do with their own reading-articulation times. In other words, ability in one test is better indicated by ability in the other test than by ability to read and articulate. All of these things show that such individual differences as are found are not at all "merely a matter of articulation."

6. *Sex Differences.* It would be hazardous, indeed, to make final statements as to general sex differences on the basis of so few observers. Nevertheless, such differences as prevail between the 11 men and the 8 women of the present experiment are so striking as to be extremely suggestive, and confirm the reports of Whipple and of Cohn and Dieffenbacher. The women are clearly quicker, both in association time and in reading and articulation time. The difference, from the point of view of the averages, is greater in the latter than in the former, and about the same in Color Naming as in Opposites. The averages are as follows:

	Reading.		Color Naming.		Opposites.	
	Colors.	Opposites.	Initial.	Final.	Initial.	Final.
Women	26.8	16.1	59.4	43.9	99.7	31.2
Men	33.2	18.5	77.1	49.0	113.5	36.3

The superiority of the women is clearly indicated by the following tabulation, which shows the distribution of the individual records among the 19 places in the series. All three time measurements are included in this table. It should be remembered that since there were but 8 women, while there were 11 men, the latter stand about one-third more chances of being found in the higher positions. The actual ratio of the numbers of the two sexes is, men to women, 1.37 to 1. Any ratio less than this will show superiority on the part of the women. In the second column for the women the actual numbers, multiplied by this ratio, are given, and designated corrected number. They indicate the probable number if there had been 11 women.

Positions.	Number of Men.	Number of Women.	Corrected Number of Women.	Ratio of Men to Women.	Corrected Ratio.
1 to 4.....	6	18	24.7	.33	.24
5 to 9.....	18	12	16.4	1.50	1.09
10 to 14.....	18	12	16.4	1.50	1.09
15 to 19.....	24	6	8.2	4.00	2.93

The average position occupied by the women is, in reading time, about 6 places, and in Color Naming and Association, about 3 places, higher than the average position occupied by the men.

That is to say, the chances are 4 to 1 that a woman rather than a man will occupy a given place in the first four positions if equal numbers of each compete. The chances are 3 to 1 that a man will be found occupying a given place in the last five positions under the same circumstances. In the middle 10 positions the men and women will be found in equal numbers. These results are found in the present experiment in spite of the fact that the men were actually engaged at the time in scholastic and literary pursuits, while all but three of the women were engaged mainly in housework, and had been for some time so engaged.

THE MEASUREMENT OF EFFICIENCY IN WRITING.

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Essential Elements in Writing. In measuring the efficiency of writing it is necessary to ascertain the essential constituents in the process. A simple analysis of handwriting shows that its chief elements are the legibility, speed and form, or appearance. However, the first and third, legibility and form, are so closely correlated that for practical purposes of measuring the efficiency of writing these two may be regarded as one. This leaves only two prime elements, namely, speed and quality, which need to be measured in order to determine a person's writing capacity.

Other characteristics, such as individuality, size, style, slant, etc., are of little or no importance from the practical viewpoint of writing as a means of communication, except in so far as they are factors in speed, quality or legibility.

Methods of Measuring. The speed of writing may be measured rather easily by ascertaining the amount that can be written in a given period of time, let us say, the number of letters per minute.

The quality of writing can be measured by either the Thorndike or the Ayres scale. The nature and derivation of these scales are described in the original sources. The Thorndike scale was constructed from 1000 samples of writing, furnished by pupils in school. These samples were arranged in the order of merit by forty or more competent judges. This resulted in a scale of graded specimens ranging in quality from 0 to 18, the former being absolutely illegible writing, but recognizable as writing, and the latter being a perfect copybook model. A given specimen of writing is measured by putting it alongside the scale and determining to what quality it is nearest.

The Ayres scale was constructed by measuring the speed of reading 1578 samples of children's writing. The words in these samples were thrown out of their natural context. These specimens were then read by ten different persons, and an

average reading time was computed for each sample. Typical specimens were selected from the entire group, so as to represent eight degrees of legibility. The scale in its final form consists of three samples, slant, medium and vertical, for each of the eight degrees of legibility. The steps are designated as 20, 30, 40, 50, 60, 70, 80 and 90. Measurements are made in the same manner as with the Thorndike scale.

The convenience and accuracy of making measurements with either scale are practically the same. To test their relative usefulness as compared with each other and as compared with the ordinary estimates of writing made on the percentage basis, fifteen samples of children's writing were measured by twenty competent persons in three ways: (1) by the Thorndike scale, (2) by the Ayres scale and (3) by the ordinary percentile method. The results showed that the measurements made by either scale were of almost identical accuracy, and that both were very much more accurate than the estimates made by the usual percentile plan.¹

In the measurements to be reported presently the Thorndike scale was used, and all values are expressed in terms of its units. However, any measurements made by the Ayres scale can be directly compared with those made by the Thorndike scale, according to the following equivalent values. These values are derived from the above investigation, in which fifteen samples were measured by twenty persons by the use of both scales:

Writing sample No.	Value according to Thorndike scale.	Value according to Ayres scale.
15.....	7.1	22
12.....	8.25	33
3.....	8.45	30
11.....	8.75	37.1
9.....	9.05	39.5
13.....	9.3	41
7.....	9.5	41.5
14.....	9.65	47.5
8.....	9.9	50
1.....	10	48
5.....	10.1	52
2.....	11.25	58
10.....	11.35	59
6.....	11.7	60.5
4.....	12.6	71

¹A full account of this test is given in an article by the author, *Journal of Educational Psychology*, IV, 1913, p. 454.

From these values it will be found that within the limits of these qualities one step on the Thorndike scale is equivalent to 8.9 points on the Ayres scale, and hence we obtain the following equations:

Thorndike scale.	Ayres scale.
Quality 7 is equal to	22
" 8 " "	" 31
" 9 " "	" 40
" 10 " "	" 49
" 11 " "	" 58
" 12 " "	" 67
" 13 " "	" 76
" 14 " "	" 85

The Thorndike scale was used in preference to the Ayres scale in the measurements to be reported on later pages mainly because the Ayres scale does not extend as far at the lower and upper limits as the Thorndike scale. The limits of the Ayres scale lie within qualities 7 and 14 on the Thorndike scale. Quite a number of pupils in the upper grades write better than quality 14 and about half of the pupils in the first and second grades write worse than quality 7.

Administering and Scoring of Tests. The directions for making the writing tests are as follows:

Explain to the pupils that they are to write repeatedly the line "Mary had a little lamb" as well as they can and as rapidly as they can during the two minutes that will be allowed for the writing.

Explain also that they are to write continuously without interruption and to make no erasures or corrections.

The pupils are to write with pen and ink on ruled paper. Before making the test have the pupils write at the top of the sheet the name, grade, school, city, and the date.

When all are ready, have them hold their pens up in the air and then give the signal "start." Allow them exactly two minutes to write over as many times as they can "Mary had a little lamb." Both speed and quality of writing count in this test.

If desired, a different sentence may be used instead of "Mary had a little lamb." The sentence must not contain more than five to seven words, which must all be familiar to the children. The pupils, however, must not have received previous drill upon it. The sentence "Art is long and time is fleeting" has been used.

N. B.—Make sure of allowing exactly two minutes. See that all start and stop at the same time.

The time limit of two minutes is chosen because it is long enough to yield an adequate sample of writing and not too long to produce fatigue. In order to have an adequate test

of speed it is necessary to use something that can be written from memory. Either copying or dictating would interfere with the natural speed of writing.

The samples of writing are then scored for speed and quality. The speed of writing is determined by ascertaining the number of letters written per minute. The quality is measured with the Thorndike scale (or, if preferred, with the Ayres scale,) by what is called the ascending-descending procedure. That is, a group of thirty or forty samples is taken and each one is graded by beginning at the lower end of the scale and ascending until the quality is reached to which the sample is judged equal. After the entire group has been rated in this manner, each sample is judged again by beginning at the upper end of the scale and descending until equivalence is reached. (The examiner should, of course, not know or see what the first measurement was.) The average of these two determinations is taken as the final measurement. It is believed that this method yields considerably more accurate measurements than a single rating does.

Standards of Efficiency in Writing. The writing test as described has been made thus far on 4074 pupils in nineteen schools in eight cities located in three States, Wisconsin, New York and West Virginia. The test was administered and scored according to the conditions outlined. On the basis of these results tentative standard scores of efficiency have been computed for each grade. All tests were made at the end of the school year, so that standards of attainment might be derived which should be reached at the end of the respective grades. These standards, presented in the tables and curves that follow, are not the arithmetical averages of the records obtained in each grade, but they are the smoothed values obtained from these averages. As a matter of fact, these smoothed values deviate only slightly from the actual averages; but it is believed that they approximate more closely to final standards that would be obtained from many more tests in many different communities. Nevertheless, the present standard scores, while they are tentative, probably do not differ very materially from prospective ultimate standards.

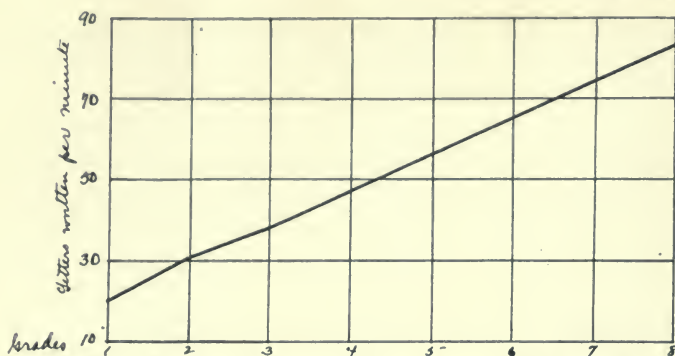


FIGURE 1.—Standard curve for speed of writing.

Standard Scores in Writing.

(Derived from tests made on 4074 pupils.)

Grades	1	2	3	4	5	6	7	8
Speed (letters per minute)	20	31	38	47	57	65	75	83
Quality (Thorndike scale)	6.5	7.5	8.2	8.7	9.3	9.8	10.4	10.9

Equivalent standard values for quality on the Ayres scale would be:

27 33 37 43 47 53 57

The following table gives the scores attained by each grade in the nineteen schools tested. The averages given at the bottom are not the arithmetical averages of the numbers given, because some of the schools were very much larger than others and their scores were weighted accordingly, so that the averages represent the actual averages for the total number of pupils tested.

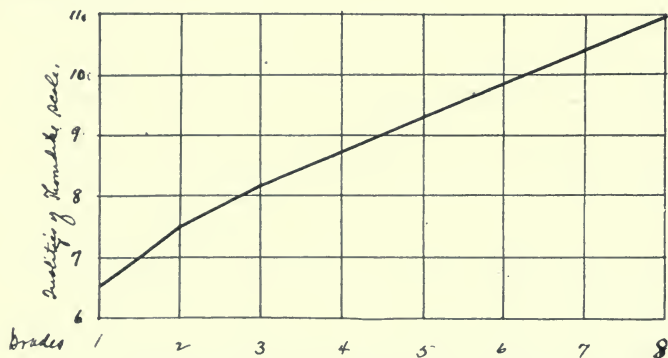


FIGURE 2.—Standard curve for quality of writing.

Speed of Writing.

(Scores made in nineteen schools.)

Grades	1	2	3	4	5	6	7	8
City A, School 1	12.9	31.5	32.9	35.3	39.4	51.8	65.3	84.6
“ 2	22.1	30.8	31.7	30.6	43.7	49.7	72.9	90.7
“ 3	18.4	21.6	25.5	44.3	44.2	59.6	86.9	86.7
“ 4	19.4	40.8	....	36.2	63.9	57.9	82.2	87.3
“ 5	16.0	38.0	40.7	47.7	56.0	83.0	81.7	89.6
“ 6	14.7	41.7	39.4	40.3	49.8	52.4	80.3	87.6
“ 7	21.6	....	....	....	56.0	50.2	....	....
“ 8	15.1	25.4	33.8	41.7	42.3	90.2	88.9	79.6
“ 9	25.4	33.5	34.9	31.1	55.8	64.4	....	....
“ 10	27.5	34.4	33.6	54.3	55.4	57.2	76.7	72.0
City B, 3 Schools . . . . .	....	24.1	39.1	39.2	58.5	60.6	48.1	69.0
City C, School 1 . . . . .	....	27.0	36.0	45.4	63.0	63.0	72.1	85.5
City D, School 1 . . . . .	....	....	36.4	42.2	41.0	46.1	74.3	73.9
City E, School 1 . . . . .	....	38.6	49.6	66.6	84.1	85.6	97.0	78.0
City F, School 1 . . . . .	....	39.1	53.1	63.6	65.2	....	85.7	83.0
City G, School 1	20.9	35.3	50.1	69.1	75.4	77.2	85.1	93.0
City H, School 1	18.0	40.0	68.0	76.0	83.0	85.0	86.0	86.0
Averages	19.5	32.2	38.9	47.2	58.6	64.3	75.9	82.3

Quality of Writing.

(Scores made in nineteen schools.)

Grades	1	2	3	4	5	6	7	8
City A, School 1	6.9	7.2	7.8	8.4	9.1	9.2	9.3	9.3
“ 2	6.4	7.6	8.1	8.5	8.7	9.5	9.4	10.1
“ 3	6.3	7.8	7.9	8.2	9.1	9.6	9.8	9.9
“ 4	5.4	7.1	....	8.8	9.3	10.8	10.5	11.6
“ 5	6.1	7.3	6.3	8.6	9.9	10.0	10.1	11.2
“ 6	5.6	7.1	7.9	8.9	9.4	10.2	10.0	9.8
“ 7	5.6	....	....	....	8.0	10.7	....	....
“ 8	5.9	8.6	7.7	9.1	9.7	8.9	10.9	10.2
“ 9	5.7	7.0	8.4	8.2	9.1	9.6	....	....
“ 10	6.5	7.3	8.1	8.8	10.0	9.9	10.2	11.0
City B, 3 Schools . . . . .	....	8.5	9.3	8.9	9.7	9.8	10.7	11.6
City C, School 1 . . . . .	....	8.5	7.6	8.6	9.1	10.5	10.7	10.4
City D, School 1 . . . . .	....	....	7.4	8.8	9.2	10.5	11.5	11.5
City E, School 1 . . . . .	....	8.2	8.4	8.1	8.5	10.0	11.3	11.5
City F, School 1 . . . . .	....	8.8	9.6	8.8	9.5	9.9	11.5	11.2
City G, School 1	7.3	8.5	8.1	9.4	8.3	9.9	9.4	10.5
City H, School 1	6.1	6.7	7.7	10.5	10.9	10.2	10.2	12.2
Averages	6.3	7.9	8.2	8.8	9.2	9.9	10.4	10.8

The efficiency of a given pupil, grade or school can be represented most simply by a graph. Figures 3 and 4 show stand-

ard graph charts. The vertical columns represent the eight grades. The two horizontal lines are the scales for the two elements of writing, speed and quality. The division marks on each scale are so placed that the middle point of any column represents the standard score for that grade taken from the table of standard scores. The numbers on the line for speed are letters per minute, and those on the line for quality refer to the Thorndike scale. Thus the graph of a pupil in the fourth grade who is exactly up to the standard in every respect would be a straight line down the middle of the fourth column. Figure 3 shows extreme differences between pupils

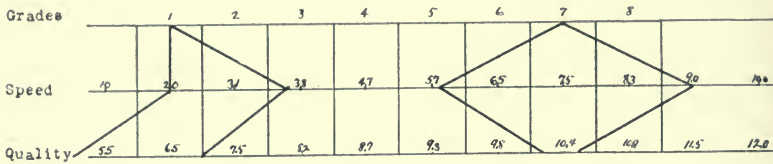


Figure 3 Scores made by four pupils in the same school.

in the same grade. The first pupil in Grade 1 is up to the standard in speed, but very deficient in quality. The second pupil is superior in both speed and quality. The two seventh-grade pupils are up to the standard in quality, but very different in speed, the one being of only fifth-grade ability and the other of more than eighth-grade ability.

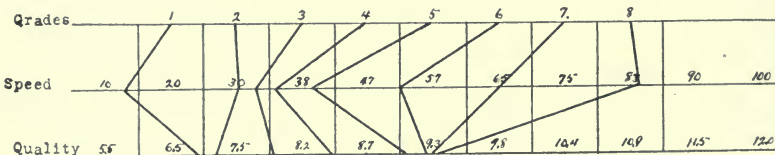


Figure 4 Scores made by the pupils in City A, School 1.

Figure 4 shows the situation in an entire school. Practically all the grades are deficient, particularly in speed. The eighth grade is notoriously backward in quality.

Individual Differences and the Overlapping of Grades. In connection with the reading test in a previous article we saw the extremely wide ranges of reading abilities in the various grades and the large amount of overlapping of the abilities

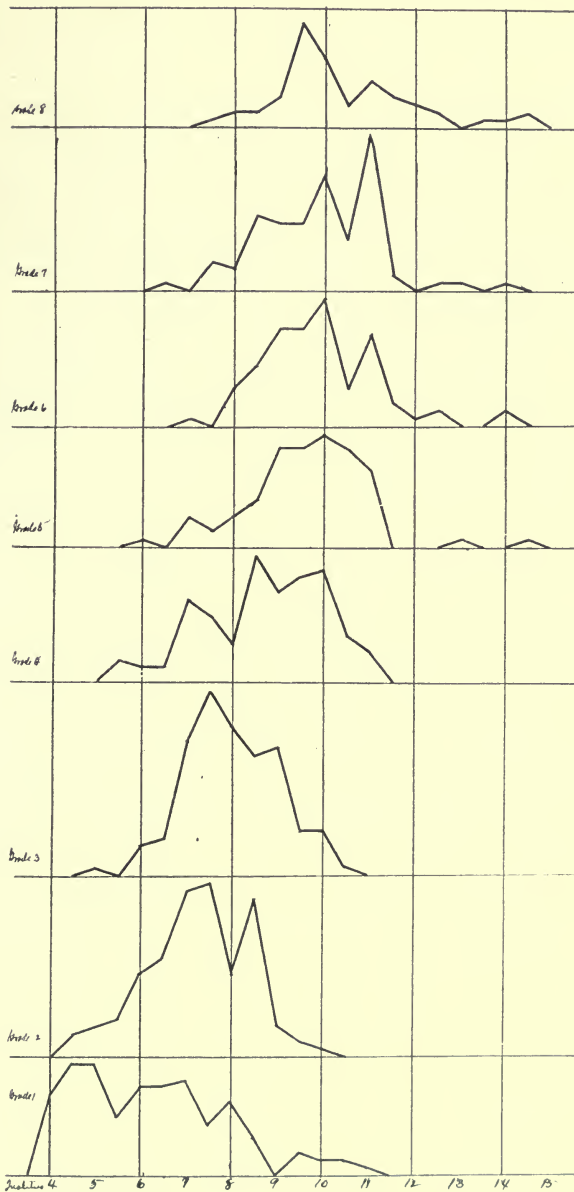


FIGURE 5.—Distribution of pupils of schools 1, 4 and 10 in City A according to quality of writing.

of the pupils in one grade over the abilities of the pupils in adjacent grades. Exactly the same situation obtains in writing.

The wide range in each grade and the amount of overlapping of successive grades in quality of writing are shown in Figure 5 for the pupils of three schools in city A. The curves in this figure represent the distribution of the pupils in each grade. They are all drawn on the same base line, so that a direct comparison can be made. The numbers along the base line are qualities of the Thorndike scale.

The pupils in the first grade range all the way from Quality 4 to Quality 11.5. The pupils in the eighth grade range from Quality 7 to Quality 15. There are five pupils in the first grade who write as well as the average in the eighth grade.

The most realistic impression of the enormous amount of overlapping can be gotten from an inspection of the curves themselves. Any grade overlaps so completely over the next one that the averages of the various grades differ from each other by only small amounts. Expressing these facts in numerical terms, we find that in quality of writing on the average 37.1 per cent. of the pupils of any given grade reach or exceed the median of the next grade above it, 24.0 per cent. reach or exceed the median of the second grade above it, 14.6 per cent. reach or exceed the median of the third grade above it and 7.7 per cent. reach or exceed the median of the fourth grade above it. Statements of the same sort apply to the speed of writing.

COMMUNICATIONS AND DISCUSSIONS.

LEARNING AGAINST TIME.

In a study of "Confusion in Recall" the writer has been finding as a by-product some suggestions upon a subject which is perhaps more vital, namely, "The Effect on Efficiency of Learning Against Time."

At the close of a half-year's laboratory course in psychology a group of 26 girls was divided into two sections of 13 girls each. One section was told to learn the following list of words:

273	732	372	723
beat	tow	desert	waist
statue	meat	week	pear
dessert	waste	stake	toe
steak	kernel	beet	meet
weak	pair	statute	colonel

They were told that the words did not have to be reproduced in exact order, but that they must be given under the respective numbers under which they appear in the test. They were told to use all the time they needed to learn the list correctly, but that they were to learn them as quickly as possible. The time required by each girl of this section was recorded by a girl of the other section.

The average time required by the 13 girls was 14 min. 47 sec. The shortest time required was 8 min. 47 sec., and the longest, 22 min. 40 sec., with an average deviation from the average of 4 min. 28 sec. Nine of the 13 girls made perfect records, while the rest made from one to three errors in omissions and displacements.

The same test was given to another group of girls; but instead of giving them all the time they chose, they were told that they would have just 9 min. in which to learn the list. This was practically the shortest time taken by any member of the first group tested.

Ten of the 24 made perfect records, and the imperfect records were, on the whole, about as good as those of the first group. This means that when the subjects knew they had only a limited time in which to do the task, almost half made perfect records in the time in which a perfect record was made by only one of the first group, working

without a time limit. Furthermore, one does not know how many of the 10 could have done the task in a shorter time than the 9 min. given. Suffice it to say that several stated they were ready "long" before time was called. Furthermore, these 10 out of 24 made perfect records in 5 min. less time than the average time required by the 9 who made perfect records in the first test. Moreover, the second group, though belonging to the same class, was a little inferior to the first in scholastic averages.

These results are not conclusive, as the number of subjects was small. However, they are sufficiently significant to warrant a further study, and accordingly the writer, in collaboration with Prof. Meyers Horner of Daleville College, Virginia, is making a rather extensive study of the problem by the use of the above test, somewhat modified, and given under various conditions and to school grades as well as normal school and college students.

Since the field is so large and has such vital relation to practical education, the writer presents this communication in the hope that others will further test the advantage to the learner of working against time.

Although the records of the experiment herein reported hardly warrant an educational application, their suggestion may call to the reader's mind some interesting facts on the practical side. Almost any student can testify to the fact that when he has habitually postponed the study of one or more particular lessons to a certain period he can succeed with the lessons to a surprising degree. How many a procrastinator has waited until the last few hours to write his oration, to prepare a lecture, to plan for a social occasion, or to do some important piece of work! He procrastinates not so much because it pleases his nature to evade a task for the present, but rather because he is merely waiting for a stimulus in the form of definite fixed limit of time facing him to goad him on.

The easy-going student that crams for examinations even surprises himself by the amount he can do in a short time before examination.

This same principle has for a long time been recognized by the world of industry, where the adoption of the system of piece work has established a continuous working against time. In the field of education this factor in efficiency has been almost wholly ignored.

G. C. MYERS.

Brooklyn Training School for Teachers.

ABSTRACTS AND REVIEWS.

CLARENCE TRUMAN GRAY. *Variations in the Grades of High School Pupils*. Baltimore: Warwick & York, Inc., 1913. Pp. 120. \$1.25.

This monograph is a study of the grades given the same pupils under different conditions. "The specific problem is concerned with the *relative standing* of pupils in the different years of the high-school curriculum, as indicated by their marks and grades." In addition to comparing different parts of individuals' records, the means of comparing teachers, and of entire schools, are given.

A consideration of the factors underlying the variations, from subject to subject and from term to term, of the grades received by a pupil is undertaken. The conclusion that "the unreliability of teachers' gradings is one of the chief causes for the variations" is well established by the data. Another conclusion of the author is that "some of the causes usually given for variations, such as home conditions, deportment, application, social tendencies, etc., play very little part in the variations." The data point to this conclusion, but it is not clearly indicated that although bad home conditions, etc., may not be correlated with *variability*, they may still be closely correlated with poor work. It also may be true that *changes* in home conditions may be highly correlated with variability in grades.

One obvious peculiarity of certain of the distributions is not discussed by the author. The plate on page 81, showing distribution of grades of pupils in English in school 1, gives a fairly normal distribution, containing frequencies for grades 75, 76, 77, etc., without a break up to 100. A similar plate for school 3 shows frequencies for grades of 75, 80, 84, 85, 89, 91, 93, 95 and 97 only. Some very effective factor, other than individual differences in teachers, is plainly responsible for this pronounced difference in distribution. The author does not mention it. It probably does not vitiate his argument, but an explanation of it would materially contribute to the "internal analysis and comparison of high schools."

A further criticism of the plates giving the distributions of grades, of which there are a goodly number, is the absence of an indicated passing mark. It is inferred from the text that 70 is the passing mark, but some of the distributions are quite inexplicable if this is so

in all cases. If 70 is the passing mark, then the reviewer does not find evidence that any of the pupils in any of the schools failed to pass in any subjects. To avoid concluding that such an utopian condition existed, it is necessary to assume that the distributions cover only those pupils who passed.

The entire study, excepting a few points a little lacking in clearness, constitutes a strong and timely appeal for the education of the teacher as to the significance of marks and methods of marking. Anyone desirous of standardizing the marking system and of interpreting the significance of marks of different schools will find many valuable suggestions in this work.

T. L. KELLEY.

University of Texas.

W. H. PYLE. *The Examination of School Children*. New York: The Macmillan Co., 1913. Pp. 70. Fifty cents.

This work is a compilation in convenient form of materials for those mental tests in Whipple's "Manual" which lend themselves most readily to group work, and of the standard physical measurements with Smedley's tables of physical norms. Specific directions are given for making the tests and for calculating and correlating the results. The chief contribution, however, is in the author's efforts to establish age and sex norms for these tests. The number of cases is small for generalization, but a good beginning has been made.

The value of the work would be enhanced if fuller details were given for presenting the tests and for making calculations of the norms. It would seem also that the material of some of the tests should have been more carefully edited. In the list of abstract words (p. 15) we find "scheme," which few children of the lower grade can spell, and the word "thing," which few experimenters can pronounce so that it can be understood perfectly away from the context. Other tests bear similar marks, as, for instance, the word "mountain" coming first in the genus-species list (p. 30). Many children fail entirely in this test because they cannot react to the first word. These and other inaccuracies, such as the report of the 23.7 girls who took the abstract memory test (p. 16), and of the 1.11 and 2.2 norms for boys, ages 13 to 14 respectively, in the part-whole test (p. 32), and the fact that whole-part instructions are given with part-whole material

(p. 31), makes one hesitate to place entire confidence in the reliability of the tables.

The little book has merit and its good points far outnumber its faulty ones. It is to be hoped, however, that in the annual contributions to this field which the author promises in his preface, we may have closer attention to scientific detail of method and a minimum of such errors and omissions. In its present form the book occupies a unique place in experimental child study and will, no doubt; be the means of stimulating and unifying work along this line in colleges and universities as well as in public school systems. In so doing, its technical defects will be corrected and around it will be built a very desirable and usable body of scientific material.

L. W. SACKETT,

The University of Texas.

JOHN GAYLORD COULTER. *Plant Life and Plant Uses*. New York: American Book Company, 1913. Pp. xvi, 464.

This is a text-book of most exceptional merit from the pedagogical point of view—and also, we believe, from the botanical point of view. Unlike the bulk of elementary and secondary texts, its organization has been rigorously thought out, and its construction, with equal rigor, has been wrought out. It bears the unmistakable evidence of skilled workmanship in its selection and arrangement of topics, in its lucidity of statement, and in its graded transition from the familiar and the psychologically simple to the unfamiliar and the psychologically difficult. A most suggestive principle of text-book construction has been employed by the author in artfully increasing the amount of “resistance” as the treatment proceeds. We have personally sought through many texts for helpful examples of clear expository teaching; we have never found these examples so numerous or so well adapted to serve as models for students of the technique of teaching as in this book. Of similar pedagogical merit are the questions and suggestions which conclude each chapter. An innovation which appeals especially to the student of text-book construction is the guide for review which occupies four pages at the close of the book. Here all of the technical terms and topics that appear in the body of the book are assembled in three tables arranged in the order of the importance of terms included. The terms in each table that are of fundamental significance are further differentiated

by black-faced type. The young teacher particularly will be able to profit by this attempt to determine relative values within the body of topics treated in a single course. With the large demands that are now made upon the time of the high-school pupil, a type of treatment that does not make essentials and fundamentals stand out sharp and clear is almost certain to miss the mark. If we mistake not, effort in this direction will be the next important step in the improvement of secondary teaching in so far as the presentation of specific subject-matter is concerned. The volume before us consequently stands as a pioneer in what bids fair to be an extensive movement.

W. C. B.

THE JOURNAL OF EDUCATIONAL PSYCHOLOGY

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EDITORIALS.

In reading the utterances of college presidents, professors and others the writer has recently been impressed by the tardiness with which investigations in educational psychology percolate into the thinking of college administrators and become a part of their intellectual substratum. We speak of the "anti-quoted faculty psychology," yet that is the type of psychology that is most in evidence in educational discussions. The limitations of "mental discipline" have been shown in dozens of investigations, yet this is made the cornerstone of argument after argument in the arrangement of curricula or the defense of particular subjects. Any new theory or any attack on an old theory in physics or medicine is quickly taken up and becomes a mental asset to be exhibited on appropriate occasions, but the field in which educators might logically be

expected to be most keenly interested seems to be generally ignored. Even so progressive an administrator as President Nichols of Dartmouth recently gave utterance to the following: "It may reasonably be doubted if one man in a hundred ever takes any single fact from college which he can turn directly into money. What he should take from college are well-trained faculties which he can turn into anything he chooses. It does not matter so much in what studies these faculties have been trained, but it does matter a great deal how much and in what spirit he has worked over them." Obviously President Nichols has not become saturated with recent studies in educational psychology.

J. C. B.

The information lecture, which had a reason for its existence before the art of printing, holds persistent sway from graduate school to kindergarten in spite of the long recognized condemnation of it by educational economy. The university professor lectures because he believes himself giving advanced information; the college teacher dictates a manual of systematic zoology because he has discarded the textbook method; the secondary school teacher of mathematics "prepares" the lesson because the text does not have the right point of view; the elementary teacher "explains" the lesson because the pupils do not have the habit of reacting to the lesson itself. These lectures are all of the same brand of predigested intellectual food.

There are many reasons for this pedagogical error; lecturing is easy as compared with the skillful eliciting of a pupil's reaction; it gives opportunity for the exploiting of personal opinion; it satisfies the pupil's craving for authority, for excuse from self-exertion, and for the ready-made pellet of serviceable knowledge. Many other such reasons might be given, but the fundamental reason lies in the fact that the teacher feels that this method is successful.

Psychologically, the lecturer may be said to be subject to an illusion which is characteristic of an inceptive elational state. He entertains a warm feeling of satisfaction over the ease, clearness, correctness, frictionlessness, economy and natural fitness of the presentation, and this subjective state of well-being is supported by the objective expression of hearty approval from the pupil and the absence of friction with ignorance. The fallacy lies essentially in the fact that this feel-

ing of satisfaction attaches to the achievement of the lecturer instead of that of the pupil.

A secondary ground for the illusion is found in the tendency to overestimate our own achievements as compared with the achievements of others. Many of these lecturers would discover the frailty of their offerings if they attempted to put them into permanent form. The oral method of instruction has permanent value in many forms, but the information lecture would disappear if those who use it examined the grounds of their feelings of satisfaction with it.

C. E. S.

NOTES AND NEWS.

At the meeting of the American Psychological Association, Philadelphia, December 29-31, there were many papers of interest to educational psychologists. At the joint session with Section L of the American Association for the Advancement of Science the following program was presented: "Habit Formation and Modern Language Training," Stuart H. Rowe; "Initial Speed and Total Gain in Learning," E. A. Kirkpatrick; "Notes on Certain Phases of Learning," S. S. Colvin; "Some Learning Curves," M. E. Haggerty; "Some Norms of College Freshmen," W. V. Bingham (to be published in this JOURNAL); "A Study in Mental Retardation in Relation to Etiology," Bird T. Baldwin; "A Method for Quantitative Study of Family Likeness in Arithmetical Abilities," Margaret L. Cobb.

A session was devoted to mental tests, at which the following papers were scheduled: "The Point Scale Method of Measuring Mental Ability," R. M. Yerkes; "The Point Scale Rating of Delinquents," Thomas B. Haines; "Correlations Between the Binet Tests and Other Mental and Physical Tests," Edward K. Strong, Jr.; "Results of Application of the Binet-Simon Tests to Groups of White and Colored Children," G. R. Wells; "Norms of Negro Mentality," W. H. Pyle; "The Standardization of Knox's Cube and Feature Profile Tests," Rudolf Pintner; "Tests for General Intelligence," Colin A. Scott; "The Influence of Improvement in One Simple Mental Process Upon Other Related Processes," A. T. Poffenberger (to be published in this JOURNAL.)

Other noteworthy papers were "Effect of Heat, Humidity and Stagnancy of Air Upon Mental Work," E. L. Thorndike; "A Proposed Classification of Mental Functions," George A. Coe; "Concerning the Religion of Childhood," W. T. Shepherd; "Effects of Practice on the Singing and Discrimination of Tones," E. H. Cameron; "The Acquisition of Skill in Archery," K. S. Lashley; "A New Method of Studying Ideational and Allied Forms of Behavior in Man and Other Animals," R. M. Yerkes; "Two Cases of Criminal Imbecility," Henry H. Goddard, and "The Value of Anthropometric Measurements in the Diagnosis of Feeble-Mindedness," E. A. Doll.

The meetings of Section L (Education), American Association for the Advancement of Science, Philadelphia, December 30-31, were devoted to papers on educational measurement and on the exceptional child. The papers were as follows: "A Score Card for Physical Growth," Bird T. Baldwin; "The General Effects of Visual Sense Training in Children," C. P. Wang; "Some Results of the Measure-

ment of the Efficiency of Instruction in Reading," H. A. Brown; "Experiments and Measurements in Reading," Walter F. Dearborn; "The Variability in the Use of the Ayres Scale for Grading Handwriting," H. T. Manuel; "An Analytical Method of Judging Handwriting," Frank N. Freeman; "Objective Means of Setting Educational Standards," E. L. Thorndike; "Testing the Reasoning Power in Arithmetic of Eighth Grade Children," James E. Lough; "Norms of Motor Development for Normal Children," J. E. Wallin; "The Size of Class as a Factor in Schoolroom Efficiency," Chas. S. Harlan; "A Study of Home Study," W. H. Heck; "Method and Results of a Co-operative Investigation in Arithmetic," M. E. Haggerty; "Measurements Showing the Effect of Latin in English Vocabulary Building Upon High School Students in the Commercial Course," Albert S. Perkins; "Measurement of Certain Abilities in Algebra," W. S. Monroe (Kansas); "Application of Courtis Arithmetic Tests to College Students," Bird T. Baldwin; "A Picture-Arrangement Test," D. Kennedy Fraser; "A Graded Series of Completion Tests," M. R. Trabue; "Care of Exceptionally Bright Children," M. P. E. Groszmann; "Intelligence and Its Measurement," J. H. Doyle; "The Effects of Blindness Upon Mental Growth," C. Homer Bean; "The Vital Index in Relation to Retardation and Acceleration," B. W. De Busk; "Diagnostic Values of Some Performance Tests," T. H. Haines; "The Selection and Training of the Exceptionally Able Child," David Spence Hill, and "The Cost of Teaching Exceptional Children," Leonard P. Ayres.

The Twelfth Annual Convention of the Religious Education Association will be held at Buffalo, N. Y., March 3-7, 1915. The 30 different meetings of the convention will focus on the topic of "The Rights of the Child." There will be about 100 papers and addresses discussing the place of the child in the family, the churches, the State, the schools and the civic life, and the plans for properly fitting the child for the needs of modern life.

The Department of Superintendence and other sections of the N. E. A. and affiliated societies will meet at Cincinnati, February 22-27. Interesting features of the program are a series of discussions on the training of teachers, the results of plans to measure efficiency in teaching, how shall the efficiency of teachers be tested and recorded, and the investigation of the efficiency of schools and school systems. At the meeting of the National Council the final report of the committee on tests and standards of efficiency will be presented. The National Society for the Study of Education will consider economy of time in the various school subjects. The Society of College Teachers of Education will discuss the work done in departments of education, and the need for a uniform educational nomenclature.

The first number of *Educational Administration and Supervision* makes a favorable impression and gives promise of a high degree of excellence. There is an introductory article by Professor Cubberley on the types of service that the journal may render, an interesting study of the American school superintendent by Professor Coffman, a very clever presentation of the high-school issue in the form of a dialogue, after the manner of Plato and Berkeley, by Professor Johnston, a study of the way in which American colleges keep their students informed of the judgments passed on their work by their instructors by Professor Davis, discussions, book reviews, editorials and books received. The journal deserves the cordial support of all those interested in administration.

The first number of the new weekly educational journal, *School and Society*, edited by Dr. J. McKeen Cattell, brings interesting articles by Charles W. Eliot, G. Stanley Hall and William T. Foster, comments on educational events, educational notes and news, discussions and correspondence, books and literature, educational research and statistics, and reports of societies and meetings. The new journal bids fair to become the leading American periodical for educational news, and for the informal discussion of topics of current interest.

It is greatly to be regretted that, according to the daily press, the trained horses of Elberfeld, about whose reasoning attainments there has recently been so much discussion in psychological circles, were requisitioned by the Prussian military authorities for an artillery battery, and were killed on a Belgian battlefield.

Thomas F. Vance (Ph.D., Iowa) has been made assistant professor of psychology in the Iowa State College of Agriculture and Mechanic Arts.

World Book Company has moved its Chicago office from 104 S. Michigan avenue to 6 N. Michigan avenue. The office is on the nineteenth floor of the Tower Building, which is on Michigan avenue at the corner of Madison street, halfway between the Public Library and the Art Institute of Chicago. Teachers visiting Chicago are always welcome.

PUBLICATIONS RECEIVED.

(Notice in this section does not preclude a more extended review.)

Agricultural Teaching. Bulletin No. 601. Washington: Bureau of Education, 1914. Pp. 87.

A collection of the papers presented at the fourth annual meeting of the American Association for the Advancement of Agricultural Teaching, held at Washington November 11, 1913.

MARY GOOCH ANDERSON. *Stories of the Golden Age.* New York: The Macmillan Company, 1914. Pp. viii, 231. Forty cents net.

A charming collection of tales from the mythology of Greece and Rome. The stories are so well and yet so simply told that they appeal to even very young children.

FRANK WASHINGTON BALLOU. *Scales for the Measurement of English Composition.* The Harvard-Newton Bulletins, No. 2. Cambridge, Mass.: The Harvard University Press, 1914. Pp. 93.

After some experimenting with the Hillegas Scale in the schools of Newton, the author decided that it was not satisfactory, because it attempted to measure too varied a product, and because the samples in it are not representative of good school work. He therefore determined to construct a scale for each of the four forms of discourse—description, exposition, argument and narration. Out of a large number of compositions written by eighth grade pupils, 25 for each form of discourse were so selected as to be representative of all degrees of quality from the best to the poorest. These selected compositions were read, graded and ranked by each of 24 readers, chiefly eighth grade teachers and supervisors. On the basis of this ranking six compositions, representing the grades A, B, C, D, E and F, were chosen to constitute the scale. The monograph gives a detailed account of the statistical derivation of the scales, and a synopsis of the merits and defects of each composition, as indicated by the criticisms of a considerable number of teachers of English.

MARGARET BEMISTER. *Indian Legends. Stories of America before Columbus.* New York: The Macmillan Company, 1914. Pp. viii, 187. Forty cents net.

These stories are retold for children from the folklore of the North American Indians, as collected by the Bureau of American Ethnology. They will bear comparison with many of the fairy tales col-

lected by the Brothers Grimm, and they form an interesting addition to the "Everychild's Series."

CHARLES SCOTT BERRY. *Some Limitations of the Binet-Simon Tests of Intelligence*. Reprinted from Transactions of the Fourth International Congress on School Hygiene, Buffalo, August, 1913. Pp. 6.

Among the limitations noted are the exclusion of such phases of mental activity as will, feeling, attention, perseverance and docility from the scope of tests; the excessive difficulty of the tests for the higher ages; the gaps in the tests for the adolescent years, and the lack of a standardized procedure.

WILLIAM K. BOYD. *The Finances of the North Carolina Literary Fund*. Reprinted from the South Atlantic Quarterly, July and October, 1914. Pp. 22.

A history of the endowment fund by which public education was maintained in North Carolina from 1825 to 1868. An interesting contribution to Southern educational history.

EDWARD F. BROWN. *Dental Clinics for School Children*. Reprinted from the Journal of the Allied Dental Societies, September, 1914. 437-448.

Under the leadership of the Bureau of Welfare of School Children of the New York Association for Improving the Condition of the Poor, representative New York dentists are advocating the following program for 1915: The establishment of nine additional dental clinics, making fifteen in all; location of clinics in school buildings, with hours from 9 to 5, and with two shifts of dentists, each working half-time; salaries of \$1200 per year for half-time work; clinics should extract, provide plastic fillings, and clean teeth only; concentration on children between six and eight years of age; a system of checking the work of dentists, and supply of tooth-brushes, mouth and tooth preparations to school children at cost.

EDWARD F. BROWN. *The Health Supervision of School Children of New York City*. Reprinted from the Medical Review of Reviews, September, 1914. Pp. 10.

The chief weaknesses of the present system are inadequacy in the number of inspectors, so that only a third of the school children are examined in any one year; inadequate nursing staff, so that less than one-fourth of those reported defective receive treatment; and inadequate supply of special clinics for the more careful examination and treatment of pupils with eye, ear, nose, throat and teeth defects.

HERBERT WILLIAM CONN. *Social Heredity and Social Evolution. The Other Side of Eugenics.* New York: The Abingdon Press, 1914. Pp. vi, 348. \$1.50 net.

The author of this volume is one of the best-known American writers on evolutionary topics, and anything on this subject from his pen is worthy of consideration. But the present volume is of particular interest to educational psychologists, in that it is a treatise on the learning process as a biological and social phenomenon. For by social heredity the author means docility, or the process of handing on to the coming generation the attainments and acquisitions of preceding generations. The laws of this process the author finds to be quite different from those of organic heredity—so different that in some respects social heredity works directly in opposition to organic heredity. From the antithesis between these two factors in evolution arise considerations of great moment for our attitude toward current problems in eugenics, and the upshot of the argument is to restore to eugenics, or education, the position of importance in social evolution which recent eugenic writers tend to minimize. Interesting and significant chapters are those on the origin of language, the evolution of the moral sense, the origin of the family and the development of different types of social organization, the mental aspects of social evolution, and the contrast between egoism and altruism in evolution. The book is an able and thoughtful study of fundamental questions in education from the point of view of modern biology.

JEREMIAH CURTIN. *Fairy Tales of Eastern Europe.* New York: McBride, Nast & Co., 1914. Pp. vii, 259. \$1.50 net.

An attractive collection of tales from Hungarian, Bohemian, Servian and Russian sources compiled by the translator of "Quo Vadis." This brilliant scholar and linguist spent practically his whole life in the study of dialects, customs and folklore of little known tribes and peoples, and the tales in the present volume were collected by him personally during his travels and sojournings in Eastern Europe.

LOREY C. DAY. *Alphabet Friendships.* Reprinted from Pedagogical Seminary, Vol. 21, September, 1914. Pp. 321-328.

An account of a boy's curious relations of intimate friendship with certain letters of the alphabet.

LOREY C. DAY. *The Child God.* Reprinted from Pedagogical Seminary, Vol. 21, September, 1914. Pp. 309-320.

The story of an imaginative world created and developed by a boy between the ages of six and twelve.

WILL EARIHART. *Music in the Public Schools*. Bulletin No. 607. Washington: Bureau of Education, 1914. Pp. 81.

A tabulation of the answers to a series of questionnaires on the teaching of music in elementary schools, in high schools, and in State school systems, and on the provisions made for the training of teachers of music in normal and training schools.

THOMAS D. ELIOT. *The Juvenile Court and the Community*. New York: The Macmillan Company, 1914. Pp. xv, 234. \$1.25 net.

A thoughtful, constructive discussion of the work of the juvenile court during the few years of its existence, a consideration of the criticisms that have been made of it, and an examination of its claims for support and continuation. As an ardent friend of the unfortunates in whose behalf the juvenile court was established the author concludes that "the present functions of the juvenile court and its probation office could and should be performed by the school and the domestic relations court."

J. J. FINDLAY AND K. STEEL. *Educative Toys*. London: Blackie & Son, 1914. Pp. 103. 1s. 6d.

This is an account of investigations with Montessori and other apparatus conducted at the Fielden School, University of Manchester, England. On the whole the conclusions are favorable to the use of the Montessori apparatus and method, although the very general nature of the observations and the rambling character of the report make it difficult to determine just what the value is. It is especially to be regretted that the authors deliberately refrained from using any of the controls which would lend a scientific value to their observations. Indeed, their antipathy to the use of the word "experiment" and to the mental attitude that it implies is so frankly avowed that one wonders whether such discussions have any weight whatever.

DOROTHY CANFIELD FISHER. *Mothers and Children*. New York: Henry Holt & Co., 1914. Pp. xiii, 235. \$1.25 net.

These delightful essays and anecdotes on the simplest and commonest things in the experiences of children and parents deserve to be read and pondered over by a very large number of American men and women. They are singularly sane and wholesome, and the charming style in which they are written makes them as interesting as a volume of short stories.

GERALD ELTON FOSBROKE. *Character Reading Through Analysis of the Features*. New York: G. P. Putnam's Sons, 1914. Pp. ix, 193. \$2.50 net.

The most commendable things about this book are the 56 superb illustrations by Carl Bohnen and the excellence of its mechanical

construction. As for the text, it is scarcely conceivable that such crass phrenology could be inflicted upon a public that professes to have some respect for science. There is a need for serious-minded study of the relation between facial expression and temperament, but this need is in no way met by the pompous and dogmatic characterizations that are to be found on these pages.

CHARLES ROBERT GASTON, Editor. *Swift's Gulliver's Travels*. Cincinnati: The American Book Co., 1914. Pp. 152. Twenty cents. A useful school edition of this classic.

ELIZABETH HARRISON. *The Montessori Method and the Kindergarten*. Bulletin 602. Washington: Bureau of Education, 1914. Pp. 34.

An account of a visit to one of the "case dei bambini" in Rome, and a discussion of the Montessori methods of procedure by one of the leaders in American kindergarten work. The author recognizes and praises much that is good in the doctrine, but also points out the limitations of the Montessori theory.

DAVID S. HILL. *An Experimental Study of Delinquent and Destitute Boys in New Orleans, and Notes Concerning Preventative and Ameliorative Measures in the United States*. New Orleans: Published by the Commission Council, June, 1914. Pp. 130.

The chief features of this excellent report are a detailed account of the psychological, anthropometric and medical studies of 63 delinquent boys from 8 to 17 years of age, and a survey of the measures that are taken in various parts of the country in dealing with such youth. In the psychological examination four individual tests (form-board, Binet-Simon, color naming, and Aussage) and two group tests (Ebbinghaus-Terman completion test and Courtis-Heck arithmetic test) were used. The examinations showed that not more than 20 per cent. of the boys could be called in any sense defective, but that a majority of them were somewhat slow and dull, doubtless because of their previous manner of life. The last section of the report gives a very good summary of the activities of the most successful agencies for the care of delinquent children.

HENRY BUDD HOWELL. *A Foundation Study in the Pedagogy of Arithmetic*. New York: The Macmillan Company, 1914. Pp. xi, 328. \$1.25 net.

This book presents the results of work done in New York University in partial fulfillment of the requirements for the Ph.D. degree. The first 200 pages are devoted to a survey of the literature on the subject. This is divided into genetic studies, including the number ideas of

primitive men, children and arithmetical prodigies, psychological studies on the perception of number, counting and reasoning, statistical studies of efficiency, ideation, transfer, etc., and didactical studies of apprehension. Part II deals with the author's own experiments in number apprehension, and concludes with a detailed analytical study of the application of the Courtis Tests, Series A, to 300 school children from the third to the eighth grade.

DAVID STARR JORDAN AND HARVEY ERNEST JORDAN. *War's Aftermath*. Boston: Houghton-Mifflin Company, 1914. Pp. xxxi, 104. Seventy-five cents net.

The sub-title of this book is "A Preliminary Study of the Eugenics of War as Illustrated by the Civil War of the United States and the Late Wars in the Balkans," and the introduction was written August 25, after the outbreak of the present European war, and discusses some of its probable consequences. There is an account of an intensive study of certain portions of Virginia with reference to the effects of war, and a study of the replies received to 30 propositions expressing the conclusions of the authors and submitted to a large number of thoughtful and open-minded men. The result is a cogent and convincing argument for peace. Unfortunately, however, neither individuals nor nations pay any heed to argument when their passions are roused.

HOMER WALKER JOSSELYN. *Survey of Accredited High Schools and Professional Directory*. Bulletin of the University of Kansas, Vol. xv, No. 16, July 1, 1914. Pp. 252.

So far as the writer's knowledge extends, no other state has such a complete and carefully compiled directory of high school teachers as Kansas. But this is not a mere teachers' directory. The first 125 pages are devoted to a statistical and analytical study of Kansas high-school conditions, and to a discussion of high-school problems that takes rank as a constructive contribution to educational literature. And in view of the fact that it is printed in the directory which every superintendent, high-school principal and teacher will keep at hand, it constitutes one of the most effective means for diffusing new ideas and stimulating school men to act on them.

JOHN KENNEDY. *The Batavia System of Individual Instruction*. Syracuse: C. W. Bardeen, 1914. Pp. xxi, 299.

The Batavia System has been so much talked of and written about that it is a satisfaction to have this authoritative discussion of it by its originator and by those who have personally studied it. True, we must approach the book in an appreciative rather than a critical frame of mind, for we find here only the statements of its advocates

and well-wishers. Many of the pages have a flavor of the rhetorical about them that will have to be credited to the enthusiasm of the particular writer who happens to be quoted. Nevertheless, the whole forms a valuable brief in favor of the Batavia System.

The Kindergarten in Benevolent Institutions. Bulletin No. 605. Washington: Bureau of Education, 1914. Pp. 16.

Includes reports from orphanages, homes and institutions, day nurseries, hospitals and institutions for the feeble-minded and the blind.

MARION FLORENCE LANSING. *Dramatic Readings for Schools. A Practice Book in Dramatics.* New York: The Macmillan Company, 1914. Pp. x, 242. Fifty cents net.

Undoubtedly too much time is devoted to oral reading and too little to silent reading in the schools. But the most unfortunate thing is that much of the time devoted to oral reading is worse than wasted, in that bad habits instead of good ones are formed. Children should be taught to throw themselves into the spirit of what is read and really interpret it. In this respect the present collection of dramatic readings will be of great assistance to the teacher.

WILLIAM D. LEWIS. *Democracy's High School.* Boston: Houghton-Mifflin Company, 1914. Pp. xii, 130. Sixty cents.

This is a group of popular articles reprinted from the *Outlook* and the *Saturday Evening Post*. The author treats of the social aspect of the high school, its relation to the boy, the girl, and the college, and discusses the administration of a socialized high-school curriculum. If the high school is to teach a better type of citizenship, the author thinks that citizenship ought to be made the center of the course of study and required of all pupils. The chief thesis of the book is that the high school should be made to fit the pupil's present capacities and probable future needs.

LIDA BROWN McMURRY. *A Method for Teaching Primary Reading.* New York: The Macmillan Company, 1914. Pp. vi, 80. Fifty cents net.

This is a very stimulating and valuable little book for primary teachers. Part I gives an account of 13 kinds of plays and games that may be profitably utilized in teaching reading. Some of these are very ingenious, and should be of great assistance to the teacher in establishing the associations she desires. Part II discusses the question of "How to use a reader in the primary grades" and enumerates 10 habits which should be kept continually in mind. It would be of great value for the primary teacher to have these rules for habit

formation printed on a wall card and hung up where she could see them every day.

MR. AND MRS. GEORGE WALLINGFORD NOYES. *An Experiment in Home Education*. Oneida, N. Y.: Published by the authors, 1914. Pp. 24.

Describes a model kitchen, and indicates how the necessity of getting on without servants may be made an educational blessing for the entire family. The extra capital required, however, was almost \$2000, and few families would be as favorably situated with reference to sources of heat and power supply.

GEORGE HOWARD PARKER. *Biology and Social Problems*. Boston: Houghton-Mifflin Company, 1914. Pp. xix, 130. \$1.10 net.

This is the second series of the William Brewster Clark Memorial Lectures, established at Amherst College "to throw light in a genuinely scientific spirit upon the relation of the research, discovery and thought of the day to individual attitude and social policy," particularly that aspect of social policy that has a bearing on social control. The titles of the lectures are "The Nervous System," "Hormones," "Reproduction," and "Evolution." In the first lecture the author indicates the function of the nervous system through the range of animal life as an integrator of reactive behavior, and shows how society is the result of that integration. In the final chapter much is made of the contrast between organic heredity and social heredity, and while biologically what we are depends on the structure of the germ plasms that entered into our make-up, socially what we are depends to a great extent upon the adjustments that we have been trained to make.

L. W. PAYNE, JR. *Learn to Spell. A Practical Handbook for High School and College Students*. Austin, Texas: University Cooperative Society, 1914. Pp. 79. Twenty-five cents.

This little manual contains a brief discussion of the reasons for poor spelling, the elucidation of seven major and seven minor rules for spelling, a list of words frequently misspelled in English composition exercises, and 13 special lists of difficult words apt to be misspelled in the various college subjects.

Perception. Compiled and published by the Class of 1914, Fitchburg, Mass., State Normal School. Pp. 25.

An account of a series of class discussions and exercises on perception, doubtless of considerable value to the members of the class that collected them.

L. A. PITTINGER, Editor. *Macaulay's Speeches on Copyright and Lincoln's Address at Cooper Union*. Cincinnati: American Book Company, 1914. Pp. 94.

Three masterful examples of oratory that will enrich the repertory of high-school readings.

BENJAMIN RAND. *Berkeley and Percival*. Cambridge: University Press. New York: G. P. Putnam's Sons, 1914. Pp. x, 302. 9s. net.

All those who are interested in the development of philosophical thinking will be grateful for the publication of this correspondence between the great English idealist, Bishop Berkeley, and his friend and protector, Sir John Percival, afterwards Earl of Egmont. True, there is much that is trivial and inconsequent in the letters, but they give an excellent picture of the time and the difficulties with which theological philosophers had to contend.

ERNST RIESS AND ARTHUR L. JAYNES. *Caesar, Gallic War, Books I and II*. Cincinnati: The American Book Company, 1914. Pp. 599.

This is a veritably encyclopedic edition of the famous Commentaries. There are beautifully-colored maps, numerous illustrations, abundant notes, an extensive grammatical summary, a series of well-graded exercises in prose composition, and over 200 pages of selections from other writings of Caesar and from Nepos designed for sight reading.

AMY STEEDMAN. *Legends and Stories of Italy*. New York: G. P. Putnam's Sons, 1914. Pp. vii, 188. \$1.50.

These delightful stories of old Italian life are not only entertaining, but they bring the reader in contact with the very essence of Italian culture. The sumptuous illustrations in color add greatly to the charm of the stories. Nothing will give greater delight to the children than these fascinating tales.

MENCO SFERN AND ROBERT ARROWSMITH. *Aus deutschen Dörfern*. Cincinnati: The American Book Company, 1914. Pp. 162.

A group of simple folk tales vividly depicting incidents in the life of the German common people. An excellent book for beginners.

ROSCOE GILMORE STOTT, Editor. *Selected Poems and Tales of Edgar Allan Poe*. Cincinnati: The American Book Company, 1914. Pp. 172.

A collection of some of Poe's best works.

CLARA HARRISON TOWN. *The Contribution of Visual Imagery to Verbal Thought. A Comparative Study of Seeing and Blind Subjects.* Reprinted from the Illinois Medical Journal, October, 1914. Pp. 15.

Two exercises in spelling were used as tests for imagery. One involved spelling 22 words backward, time and errors being taken as the measures. The other called for recognition by the subject of 22 moderately difficult words spelled backward by the experimenter. The seeing subjects gave slightly the best results. The author does not consider the tests very satisfactory.

J. VARENDONCK. *Recherches sur les sociétés d'enfants.* Bruxelles: Misch & Thron, 1914. Pp. 93. 6 fr.

This monograph presents the results obtained from a questionnaire sent to a considerable number of schools in Belgium, Holland and France. Of the 308 replies received, only 134 were used. The author discusses the nature of the groups, the leaders, their selection and authority, and the attitude of the members toward outsiders and toward each other. The monograph forms an interesting contribution to the development of the spirit of social solidarity.

J. E. WALLACE WALLIN. *The Hygiene of Eugenic Generation.* Reprinted from the Psychological Clinic, Vol. VIII, Nos. 5 and 6, 1914. Pp. 27.

Points out the difficulties and uncertainties in the attempt to determine those who are eugenically unfit, and discusses the relation of alcoholism to feeble-mindedness.

ELLA FLAGG YOUNG AND WALTER TAYLOR FIELD. *The Young and Field Literary Readers.* Book Three. Pp. 288. Forty-eight cents. Book Four. Pp. 320. Fifty-two cents. Boston: Ginn & Co., 1914.

Book Three contains selections from Grimm, Stevenson, Eugene Field, Edward Lear and Hans Anderson, and legends of the American Indians, the Norsemen and the Greeks. Book Four presents stories from home life, legends and folk tales, fairy stories, animal stories, stories of life in other lands, and stories from American history.

THE JOURNAL OF EDUCATIONAL PSYCHOLOGY

THE IMPORTANCE OF SOCIAL STATUS AS INDICATED BY THE RESULTS OF THE POINT-SCALE METHOD OF MEASURING MENTAL CAPACITY.¹

ROBERT M. YERKES AND HELEN M. ANDERSON,

Harvard University.

During the past year we have developed, to meet the needs of the Psychopathic Hospital, Boston, a method of measuring mental capacity which is based upon the late Dr. Huey's suggestion of a point scale. The method has been briefly described in a preliminary article,² and a detailed description, with report of the results of its application to about one thousand normal and pathological individuals, is in preparation and will be published in book form by Warwick & York, Baltimore, early in 1915.

In contrast with the Binet-Simon measuring scale of intelligence, the new scale consists of a single series of tests which may be given to individuals ranging in age from four

¹Being contributions from the Psychopathic Hospital, Boston, Mass., No. 65 (1915, 2). (Bibliographical Note.—The previous contribution, No. 64 (1915, 1), was by A. W. Stearns, entitled "On the Occurrence of Hallucinoses in 500 Cases of Mental Disease," published in the *Journal of Nervous and Mental Diseases*, January, 1915.)

²YERKES, ROBERT M., AND BRIDGES, J. W. *The Point Scale: A Method of Measuring Mental Capacity*. Boston Medical and Surgical Journal, 1914, Vol. 171, pp. 857-865.

to fifteen years. Credit for the individual's performance in the various tests is given according to merit, and not by the "all-or-none" method used by Binet and his associates.

The Point Scale consists of twenty tests, many of which include several parts, arranged in what appeared to be the order of increasing difficultness. It was arranged for the pre-adolescent period, and was not intended for the examination of adults. From the first we had in mind the possibility of a scale which should be universally applicable, but we deemed it wiser to test thoroughly the single-scale and partial-credit ideas before attempting to arrange a graded series of tests which should be equally applicable to individuals of all ages.

The Point Scale differs also from the Binet Scale in that, instead of being standardized at the start, it becomes standardized by the establishing of norms, in relation to which its results are stated.

We present herewith the original form of record blank which was used in our preliminary work. In the second printing of this blank tests 1 and 2 were reversed, since it was evident that young children entered upon the work more favorably if first of all presented with the picture materials. In two of the remaining tests a change in the order of parts was made: in test 6 fork and horse were interchanged, while in test 17 obedience and charity were interchanged.

The following brief description by tests, with indication of the materials used and the method of crediting response, will give the reader a fair knowledge of the scale, although it will not suffice as direction for the satisfactory application thereof.

Test 1 consists of three sentences graded in difficultness. For the perfect repetition of each two points credit is given. The maximum score for this test is therefore six points.

Test 2 makes use of the three Binet pictures. For the enumeration of the objects in a picture, one point credit is given; for the description of a picture, two points, and for interpretation in addition to description, three points. The maximum credit for the test is nine points.

Test 3 is one in which the digits are presented orally at the rate of about two per second, and the subject is allowed to repeat them immediately after the series has been presented.

One point credit is given for each group correctly repeated. In case of failure in one group, a second trial with a group of the same size is allowed. The maximum credit for the test is five points.

Test 4 is a combination comparison test in which one point credit is given for each correct comparison. In order to avoid the chance of guessing, two correct judgments are required. For this test the maximum credit is three points.

Test 5 demands the copying of the Binet square and diamond. For recognizable reproductions fulfilling certain definite requirements, one point credit is given; for reproductions superior in certain definite respects, two points. The maximum score for the test is therefore four points.

Test 6 demands the defining of four words. One point credit is allowed for each definition by use, and two points for each definition superior to use, as, for example, by description. The maximum credit for the test is eight points.

Test 7 makes use of the three pairs of Binet pictures and requires judgments of preference on the basis of aesthetic feeling. One point credit for each correct judgment makes the maximum score for this test three points.

Test 8 makes use of the Binet drawings in order to test the detection of missing parts. One point credit is allowed for each correct response, thus making the maximum for the test four points.

Test 9 requires free association of maximum rapidity. Credit is allowed according to the number of words given, ranging from one to four points.

Test 10 demands the comparison of pairs of objects. Two points credit is allowed for each comparison in which two correct differences are given. The maximum credit for the test is six points.

Test 11 requires the individual to count backward from 20 to 1. The credit for this performance is four points; or from 15 to 1, three points; from 10 to 1, two points, and from 5 to 1, one point.

Test 12 is an attempt to measure the individual's ability to comprehend and respond intelligently to the following questions:

BOSTON STATE

DATE.....

EXAMINED BY.....

NAME..... DATE OF BIRTH.....

TEST

CREDITS

1. Repeats: (a) It rains. I am hungry. (2)
 (b) His name is John. It is a very fine day. (2)
 (c) It is not necessary to hurt the birds.
 It is night and all the world rests in sleep. (2)
2. Reaction to three Binet pictures: enumeration, (1 each); description, (2 each); interpretation, (3 each).
 (a)
 (b)
 (c)
3. Memory span for digits.
 (a) 374. 581. (1)
 (b) 2947. 6135. (1)
 (c) 35871. 92736. (1)
 (d) 491572. 516283. (1)
 (e) 2749385. 6195847. (1)
4. Compares, twice: (a) Lines, 5 and 6 cm. (1)
 (b) Weights, 3 and 12 grams. (1)
 (c) Weights, 6 and 15 grams. (1)
5. Copies (on back of this sheet) (a) square (2); (b) diamond (2).
6. Defines in terms of use (1 each); superior to use (2 each):
 (a) Chair
 (b) Fork
 (c) Horse
 (d) Baby
7. Chooses, twice, prettier of two pictures. (1 each)
8. Sees picture lacks: (a) arms; (b) nose; (c) mouth; (d) eyes. (1 each)
9. Gives words for three minutes: 30-44 (1); 45-59 (2);
 60-74 (3); 75- (4). 1st half minute 2d
 3rd 4th 5th 6th
10. Compares: (2 each)
 (a) Apple and banana
 (b) Wood and glass
 (c) Paper and cloth

HOSPITAL—PSYCHOPATHIC

RECORD BLANK FOR POINT SCALE MEASUREMENTS

MENTAL AGE.....

NATIONALITY.....SCHOOL GRADE.....TOTAL CREDITS.....

TEST

11. Counts backward: 20-1 (4); 15-1 (3); 10-1 (2); 5-1 (1).
12. Comprehends questions: (2 each)
 - (a) Missed train
 - (b) Someone unkind
 - (c) Action versus words
 - (d) Forgive easier
13. Writes (on back of this sheet) sentence containing Boston, money, river.
Three words in two (2); three words in one (4).
14. Arranges weights: two trials. All correct but one (1); correct (2).
Trial 1. Trial 2.
15. Sees absurdity: (1 each)
 - (a) Three brothers
 - (b) Swinging cane
 - (c) Unfortunate cyclist.
 - (d) Last car
 - (e) guide-post directions
16. Resists suggestions: (1 for each resistance)
17. Defines: (a) Charity (2)
(b) Justice (2)
(c) Obedience (2)
18. Analogies: (1 each)
 - (a) Oyster is to shell as banana is to
 - (b) Arm is to elbow as leg is to
 - (c) Head is to hat as hand is to
 - (d) Truth is to falsehood as straight line is to
 - (e) Storm is to calm as war is to
 - (f) Known is to unknown as present is to
19. Draws (on back of this sheet) designs from memory, after 15 sec. exposure. (2 each)
20. Puts dissected sentences together: (2 each)
 - (a)
 - (b)
 - (c)

CREDITS

- (a) If you were going away and missed your train, what would you do?
- (b) If someone has been unkind to you, and says he is sorry, what should you do?
- (c) Why should you judge a person by what he does rather than by what he says?
- (d) Why do we more readily forgive an unkind act done in anger than one done without anger?

For intelligent replies to each question, two points credit is allowed. For certain relatively unsatisfactory responses, only one point is allowed. The maximum credit for the test is eight points.

Test 13 requires the composition of a sentence containing the words *Boston*, *money* and *river*. A satisfactory sentence is credited with four points. The use of two sentences is credited with two points.

Test 14 requires the arranging in order of increasing weight of five blocks of the same size weighing, respectively, 3, 6, 9, 12 and 15 grams. A single mistake in order entitles the subject to one point credit; correct order, to two points credit. Two trials are allowed.

Test 15 gives opportunity to measure the subject's sense of humor. Five sentences are given, and in each case the subject is required to tell what is foolish about the sentence. The sentences are:

- (a) A little boy said: "I have three brothers—Paul, Ernest, and myself."
- (b) We met a finely dressed gentleman; he was walking along the streets with his hands in his pockets and swinging his cane.
- (c) An unlucky bicycle rider fell on his head and was instantly killed; they took him to the hospital and fear that he cannot get well.
- (d) It has been found that the last car of a train is damaged most in case of accident; it therefore would be better to leave off the last car.
- (e) At the cross-roads was a guidepost with the following directions: "Boston 3 miles and a half. If you cannot read, inquire at the blacksmith's shop."

For an intelligent response to each of these parts of the test one point credit is given.

Test 16 consists of the presentation of the Binet pairs of lines. One point credit is given for each resistance. The maximum for the test is three points.

Test 17 requires the defining of the abstract words *charity*, *justice* and *obedience*. Two points credit is given for each satisfactory definition.

Test 18 requires the completion of six analogies, which are

printed in full on the record sheet. For each correct response, one point credit is given.

Test 19. The subject is required to reproduce the two Binet designs after 15 seconds' exposure. For certain partial successes, one point credit is given; for complete reproduction, two points credit for each design.

Test 20 requires the rearranging of groups of words so they shall make sense. Two points are allowed for each sentence correctly constructed.

The maximum score for the twenty tests is one hundred points, and an individual's performance is expressed in terms of the number of points achieved, and is directly comparable with the results of other individuals of the same age, sex, race and social and economic status.

The accompanying figure 1 presents the distribution of the results obtained by the examination of 468 children born to the English language and ranging in age from 4 to 15 years.² The figure presents the data for the sexes separately, and indicates the average performance of these individuals grouped according to years of age and sex. We have classed as of the age of 4 all individuals from 3 years 7 months to 4 years 6 months, inclusive. It is possible to obtain, and indeed we are already constructing from examinations which have been made, norms for age, sex, language, handicap, race, and social and economic status; for, although these various differences in individuals have not been satisfactorily taken into account in connection with the use of the Binet Scale, our results clearly demonstrated the necessity of considering them. It is, as will be clear in the light of the data to be presented in this paper, wholly unfair to diagnose as mentally retarded an individual whose score falls short by 20 or even 30 per cent. of the average attained by individuals of superior opportunities. It is likewise unfair to judge by the same norms, during certain periods of development, the two sexes; and it may be equally unfair to neglect language differences and racial peculiarities.

²This figure differs slightly from the one for the same group of children presented in our first report. For this certain changes in classification are responsible. See for comparison *Boston Medical and Surgical Journal*, 1914, Vol. 171, p. 863.

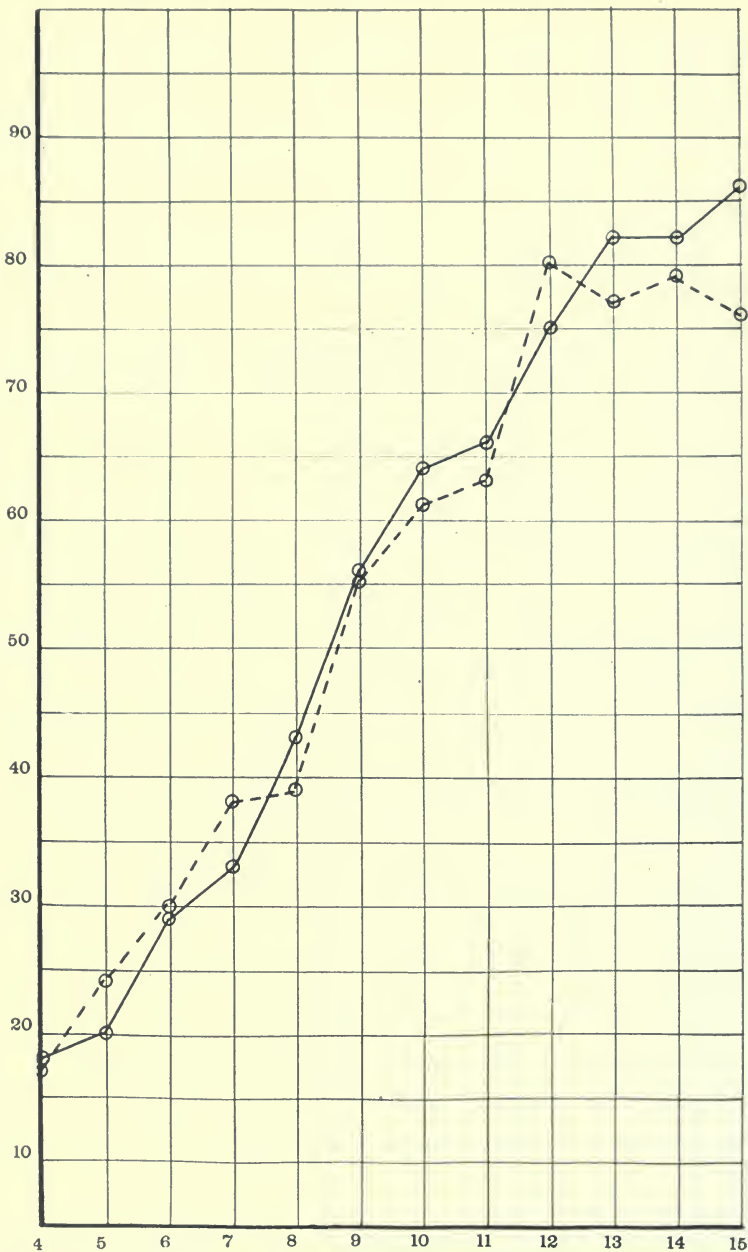


Figure 1. Norms for Children of English-Speaking Parentage in Medium to Poor Environment. Age in years on axis of abscissae; average score on axis of ordinates. Results for 468 children of one grammar school.

We propose now, in support of these contentions, to present summarily the results of point-scale examinations in two city schools⁴ which differed radically in the economic and social status of their pupils. These schools were described by the city superintendent as "good" and "medium," referring, of course, to the nature of the pupils. We shall designate the group of pupils from the former as "favored" and those from the latter as "unfavored," thus escaping implications as to the relative importance of heredity and environment.

Tables 1 and 3 present the results obtained with 26 boys and 28 girls of the favored group. These 54 individuals were the only individuals examined in the school, and all were either in the kindergarten or in the first grade.

Tables 2 and 4 similarly present the detailed scores of a like number of individuals of the unfavored group. These 54 individuals were chosen from among 675 examinations in the school. Our method was to select from the unfavored group an individual of the same sex and of the same, or approximately the same, age, as a given individual of the favored group. We excluded all cases in which language difficulties were detectable. It proved impossible to match the ages exactly, but the average age for our several groups is very nearly constant. Thus, the average for the boys of the favored group is 6 years, and the average for those of the unfavored group 6 years and 1 month, while the average for the girls of each group is 6 years and 2 months.

The tables present the score for each individual test by test, and in the last column the total number of points achieved by each individual. At the bottom of each table may be read the average score by tests and for the totals.

In Table 5 we have presented these averages so arranged that the favored groups may be readily compared with the unfavored in the case of each sex; and we have indicated also in the last columns the relation of the favored to the unfavored. Thus, the symbol + indicates that the favored group achieved a higher score than the unfavored; the symbol — that

⁴Our heartiest thanks are due the school authorities of the city of Cambridge, Mass., and especially to Superintendent M. E. Fitzgerald and Mr. A. Warren Foss.

TABLE 1.
POINT SCALE SCORES FOR BOYS—FAVORED GROUP.

No.	Age.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Total.
1	4-4	2	4	2	1			3														12
2	4-5	4	2	2	2		2	3	3								3					17
3	4-5	4	6	2	3					1												16
4	4-5	2	3	3	2	1	4				1											16
5	4-5	2	3	1	1			3														13
6	4-7	2	3	3	2		4				1						3					18
7	4-9	2	3			1		2	2		1						3					13
8	5-7	4	5	3	3		4	3	4		3		4				2					33
9	5-8	4	6	2	3	2	3	3	3	2	4				2		3					39
10	5-8	4	6	4	1	1	4	3	4		3		1				2		1			38
11	5-9	4	4	3	3	4	7	3	3	1	1	1	1				1		1			37
12	5-9	4	6	2	3	1	4	3	3	1	4	3	4			3						41
13	6-1	4	6	5	3	1	4	3	2	2	2	4	2		2		3		2			45
14	6-2	6	4	3	3	3	4	3	4	1	5	4	2						1			42
15	6-3	4	6	5	3	1	4	3	2	2	4	2	2		1				1			45
16	6-4	4	6	3	3	2	4	3	4	2	3	2	2				1		1			45
17	6-4	4	7	4	3	2	5	3	4	1	2	2	2	4	4			1	1			48
18	6-6	4	7	4	1	2	4	3	3	2	6	2	4		2		2	2	1			50
19	6-8	4	8	3	3	3	5	3	4	2	6	4	4	2		1		2	1			62
20	7-0	4	6	5	2	3	6	3	4	3	5	4	3	2	2	2	1	1	4	2		62
21	7-1	4	6	3	3	1	4	2		1	5	1	2			1		1				40
22	7-2	4	6	3	3	2	2		2	1	4	3	3		1		1		1			35
23	7-2	4	6	2	3	1	4	3	4	3	5	4	4		1		1					46
24	7-6	4	6	4	2	1	8	3	3	3	1	1	4		2		2		1			47
25	7-11	4	6	2	3	3	5	3	4	1	5	4	2	4		2		2	1	2		54
26	9-1	4	9	3	3	4	4	3	4	2	3	4	4		1	1	1	4	1			55
Averages.	6-0	3.5	5.4	2.9	2.4	1.5	3.7	2.5	2.7	1.2	2.8	1.8	2.2	0.8	0.8	0.3	1.3	0.4	0.3	0.8	0.1	37.2

TABLE 2.
POINT SCALE SCORES FOR BOYS—UNFAVORED GROUP.

No.	Age.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Total
1	4-3	4	3	2			3															12
2	4-4	4	6	3	1		4		2		1		2									23
3	4-7	4	3	2	1		2	2	1													15
4	4-7	4	4	2	1	1	1	1	2													17
5	4-8	4	3	2			2															11
6	4-10	4	6	3			4	3	1													18
7	4-10	4	4	3		1	4	3	3	1												20
8	5-7	4	6	3	3	2	2	3	1		1	2			2		2					31
9	5-8	4	6	1	3	1	1	4	3	2	2				1							25
10	5-8	4	4	3	1	1	3	2	4	1				3			2					25
11	5-9	4	6	3	1	1	3	1	1		2						3					29
12	5-9	4	5	3	2	1	5	3	4		6								2			23
13	6-1	4	6	3	1	1	3	1	1		1		2				1					34
14	6-2	4	1	2	1	2	4	3	2	1									1			21
15	6-3	4	7	3	3		4	3	3		1	4			1							33
16	6-4	4	5	2	1		3	2	3		1	1										23
17	6-5	4	7	3		2	6	1	3	1			2				3					35
18	6-6	4	6	2	1	1	5	1	3	1	3		2				3					33
19	6-8	4	6	3	3	2	4	3	4	1	4					1	3					34
20	7-1	4	6	4	1	1	4	3	4	2	4	4	2				2					41
21	7-1	4	6	5	3	3	2	3	4		2	2	1			2			1			38
22	7-3	4	6	3	3	1	3	3	1	1	2	4	1		2		3		1			38
23	7-5	4	6	3	3	1	4	3	2		3	4	1		1	3			2			40
24	7-6	4	6	3	1	3	4	3	3	1	5	4	3				3		1	1		45
25	7-11	4	6	4	3	2	4	2	3	1	4	4	2		1	1	3		1	1		45
26	9-1	4	8	4	1	4	4	3	4	1	6	4	5	4		2		2	2			58
Averages	6-1	4	5.3	2.8	1.5	1.2	3.5	1.9	2.2	0.5	2	1.3	1	0.2	0.3	0.3	1	0	0.2	0.3	0	29.5

TABLE 3.

POINT SCALE SCORES FOR GIRLS—FAVORED GROUP.

No.	Age.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Total
1	4-9	4	4	3	3	1	4	3	4		1	2	4						1			34
2	4-10	4	4	2	3		1	3	2		1	1					1					21
3	4-11	2	5	3	3	2	2	3	3	2	3		2		1		3					34
4	4-11	4	6	3	1	4	4	3		1	3	1	2				2		2			32
5	5-2	4	3	2	2	1	4	2		1	2						2					23
6	5-3		6	1	1	1	3	2	2	3	3	1										20
7	5-4	4	4	5	3	2	2	4	3	1	6	4	2				1					44
8	5-10	4	6	3	2	1	8	3	3	2	2	3	3					1				39
9	5-11	4	6	4	1	1		3	4	1	2	2	4				1	1				34
10	6-0	4	3	3	3		4	3	2	2	3	4										34
11	6-0	4	7	2	1		4	3	4		1	2	2				2					30
12	6-0	4	6	2	2	1	5	3	4	3	5	1	2		1		2					41
13	6-1	4	3	2	3	2	4	3	4	3	3	4	4		1		1		1			43
14	6-4	4	5	3	3	1	4	3	2	1	3	1	2					1	1			34
15	6-4	4	6	4	3	3	4			1	3	4	1			1	3		1			38
16	6-5	4	6	2	1	1	3	3	4			1	1							1		26
17	6-5	4	3	2	3	3	4	3	4		6	4	4		1	2	1			2		45
18	6-5	4	6	5	3	2	8	3	4	4	5	4	2		1		1		1	3		58
19	6-5	4	6	3	3	2	4	3	4	3	4	2	6		2	3		2		2		53
20	6-6	4	6	4	1	1	6	3	4	1	3	1	3		2	3	3		1	1		44
21	6-9	4	6	4	3	3	7	3	3	4	6	4	4		2	2	2		4			62
22	6-9	4	5	3	3	2	4	3	4	2	5	2								2		45
23	7-0	4	6	4	1	3	4	3	4	4	3	3					3		1			45
24	7-1	4	6	2	3	2	4	3	3	1	5	4	3						1	1		47
25	7-3	4	6	3	3	2	5	3	4	2	6	4				1	3	2				50
26	7-7	4	6	5	3	2	4	3	3	2	5		3				3					44
27	7-8	4	6	5	3	2	4	3	4	2	5	4	3			1	3	2	1	2		54
28	7-8	4	8	3	3	2	7	3	4	4	6	4	4			1	3	4	3	2	4	71
Averages	6-2	3.8	5.4	3.1	2.4	1.8	4.1	2.8	3.1	1.5	3.6	2.1	2.6	0	1	0.4	1.5	0.4	0.7	0.6	0.1	41.0

TABLE 4.

POINT SCALE SCORES FOR GIRLS—UNFAVORED GROUP.

No.	Age.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Total.
1	4-8	4	5	3	3		4	2		1	1											23
2	4-10	4	3	4	1		3	3	3	2	2		1				2					28
3	5-0	4	7	2	3		2		1	1	2		2									24
4	5-1	4	3	5	1	1		3	1	1	1						2					21
5	5-2	4	4	2			3	3	3	1	1											22
6	5-4	4	5	4	1	1	4	2	3	1			1									26
7	5-4	4	6	3	3	2	4	1	3	2	1	2			1							34
8	5-9	4	7	3	1	1	4	3	4	1	1		2			2						32
9	5-10	4	6	2	1	1	8	2	3	2	2		2			2						35
10	5-10	4	6	2	3	1	1	3	3	3	3		2		2				2			31
11	5-10	4	6	3	1	3	3	3	2		3	2	2									32
12	5-11	4	4	4	1	2	4	3	4	1							1					28
13	6-0	4	6	5	3	1	2	3	4	1	1						1					30
14	6-1	4	3	4	3	2	3	3	4	1	2	2	2									33
15	6-1	4	5	2	3	2	4	2	4	1	2	2	2			1	3					39
16	6-5	4	6	4	1	2	4	3	4	1	1	4	4		2		2		1			44
17	6-6	4	5	4	3	4	4	3	4	2	1	3	1					2				38
18	6-6	4	6	2	3	2	4	1	2	1	1											26
19	6-6	4	6	1	1	3	4	3	4	2	2		2			2						33
20	6-7	4	3	2	1	2	4	3	3		1		2						1			25
21	6-8	4	6	1	3	3			1			4					1					23
22	6-9	4	6	3	3	3	4	3	4	3	1		3			2		2				43
23	7-1	4	6	4	1	2	4	3	4	2	4	4	4		1		3					48
24	7-1	4	6	2	3	1	4	3	4	1	3	4	1		2		2		2			40
25	7-4	4	6	3	1	2	4	2	3	1	3	3	2			1	1					36
26	7-7	4	6	4	3	1	4	3	4		2	2	2				3					40
27	7-9	4	6	4	1	1	4	3	4	1	5	2	2				2					39
28	8-0	4	6	4	3	1	2	3	4	1	2		3			2			1			40
Averages	6-2	4	5.4	3.1	2	1.6	3.3	2.5	3.1	1	1.7	1.4	1.5	0	0.5	0.1	1.1	0	0.2	0.3	0	32.6

TABLE 5.

Averages for Favored and Unfavored Groups for Each Test and for Total Scores.

Test.	Favored Boys.	Unfavored Boys.	Favored Girls.	Unfavored Girls.	Relation of	
					Favored to Unfavored.	Boys. Girls.
1	3.5	4.0	3.8	4.0	—	—
2	5.4	5.3	5.4	5.4	+	=
3	2.9	2.8	3.1	3.1	+	=
4	2.4	1.5	2.4	2.0	+	+
5	1.5	1.2	1.8	1.6	+	+
6	3.7	3.5	4.1	3.3	+	+
7	2.5	1.9	2.8	2.5	+	+
8	2.7	2.2	3.1	3.1	+	=
9	1.2	0.5	1.5	1.0	+	+
10	2.8	2.0	3.6	1.7	+	+
11	1.8	1.3	2.1	1.4	+	+
12	2.2	1.0	2.6	1.5	+	+
13	0.8	0.2	0.0	0.0	+	=
14	0.8	0.3	1.0	0.5	+	+
15	0.3	0.3	0.4	0.1	=	+
16	1.3	1.0	1.5	1.1	+	+
17	0.4	0.0	0.4	0.0	+	+
18	0.3	0.2	0.7	0.2	+	+
19	0.8	0.3	0.6	0.3	+	+
20	0.1	0.0	0.1	0.0	+	+
Totals....	37.2	29.5	41.0	32.6		

it achieved a lower score, and the symbol = that there was no difference.

From this table it appears that in only one test were the unfavored groups superior to the favored. In one test the results for the two groups of boys were equal, and in two tests the results for the girls were equal, while in yet another neither group scored.

The averages of the total scores differed markedly, that for the favored group of boys being 37.2, and that for the unfavored group of boys 29.5, that is, 21 per cent. less. The favored group of girls attained an average score of 41.0, while the unfavored group attained only 32.6, that is, about 20 per cent. less. These differences are indeed startling, and they become even more impressive when, instead of comparing groups which include children ranging in age from 4 years up to 9, as in tables 1 to 4, we compared only the 6-year individuals of the two schools in question. The data for this comparison appear only in part in tables 1 to 4.

In the favored school 24 individuals were examined who

fell within the age limit of 5 years 7 months to 6 years 6 months. The range of the scores for the 11 boys in this group was from 33 to 50 points, with an average of 42 points; that for the 13 girls of the group was from 26 to 58 points, with an average of 40 points.

In the unfavored school there were examined 30 boys and 25 girls 6 years of age. The range in the case of the boys was from 11 to 39 points, and in the case of the girls 13 to 44 points, the averages being, for the boys, 29, and for the girls, 30 points.

From the individual records it appears that all of the 6-year-old boys in the unfavored group are below the average for the boys of the same age in the favored group, while of the girls only two in the unfavored group are above the average for the favored.

Differences in economic or social status seem, then, to be correlated with differences in mental capacity, as measured by the point scale, which may amount to as much as 30 per cent. In other words, at and about the age of 6 years the favored individuals do from a quarter to a third better in the point-scale examination than do the unfavored. This amount of difference, viewed in the light of the norm presented in figure 1, is extremely interesting and significant, for it may be observed that the increase of score from year to year, starting with from 20 to 30 per cent. at the age of 4, diminishes to approximately 10 per cent. by the time the age of 10 is reached. It appears, then, that the intellectual difference under discussion is equal at least to the amount of development during the fifth year of life, and possibly to even more than that.

From the data which have been presented, and the statements which have been made, it is obvious that to state the mental capacity of an individual from the unfavored group in terms of the norm for the favored group would be extremely unfair, since only those attaining the highest scores among the "unfavored" are equal to those with the lowest scores among the "favored."

The purpose of this paper is to demonstrate by the use of this single small collection of data chosen from approximately

1000 examinations the necessity for the use of norms in connection with mental examinations. The Binet Scale does not lend itself to the employment of norms; the Point Scale has this advantage, and we wish to insist, as the result of the analysis of our data, that norms for sex, language, race, and social and economic status are quite as important as are norms for age. We propose to make use of such norms, in connection with our examining at the Boston Psychopathic Hospital, just as rapidly as they can be satisfactorily established.

It is our conviction that in the greater part of the practical work of mental examining which has been done during the past ten years far too little attention has been paid to the problem of comparability. We propose so to standardize our point-scale method that the mental ability of a subject may be expressed in its relation to the group in which he belongs; and the relation of that, in turn, to other increasingly dissimilar groups should be available for the use of the examiner. The groups in question may be restricted as closely as need demands. It is, for example, not adequate for us in the school system of the American city to treat all individuals as though born to the English language. Indeed, it may ultimately become clear that, while applying the same scale to individuals of every race, we should evaluate our results always in the light of definitely established racial norms.

It has not seemed feasible to discuss in this brief paper the work of other students of social and economic status. We have not overlooked the fact that there is an important, although extremely unsatisfactory, body of literature on the subject.⁵

⁵See W. STERN. *The Psychological Methods of Testing Intelligence*. Baltimore, 1914, p. 50.

G. M. WHIPPLE. *Manual of Mental and Physical Tests*. Baltimore, 1914, under "sociological status."

A PSYCHOLOGICAL STUDY OF BRIGHT AND DULL PUPILS.

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The purpose of this study is to ascertain what mental differences between groups of bright and dull pupils can be discovered by the use of group tests. Terman and others have made similar studies on smaller groups of children. It has been our purpose to make the study in several high schools, as well as in the grades, thereby testing pupils at work under different conditions as well as pupils of different ages. The groups were selected on the basis of success in school work. The bright groups include the pupils most successful in school work; the dull groups, those least successful. The criterion of success used was school marks. We have considered the most successful pupils to be those having the highest marks for the school year; the least successful pupils, those having the lowest marks.

The tests used are those described in the author's *Examination of School Children*—tests of logical memory, rote memory, word-building, three types of association tests, and, in addition, four completion tests. Three of the latter are from Whipple's *Manual*, the other from Franz.

The tests were given in the following schools: (1) The high school at Mexico, Mo. The best ten and the poorest ten pupils were selected for the tests. (2) The high school at Kennett, Mo. The best four and the poorest four in each high school class, *i. e.*, freshman, sophomore, junior and senior, were selected. (3) The high school at Hannibal, Mo. The selection was the same as at Kennett. (4) A group of the brightest and a group of the dullest pupils in the Westport High School of Kansas City, Mo. The selection was made on the basis of a teacher's judgment. (5) The best and poorest grade pupils of the grade school at Mt. Washington, Mo. (6) The twelve

year-old pupils distributed through four grades of the Mexico schools. Since different groups of tests and, in some cases, different tests of the same kind were used, the results are recorded separately for the different schools. The results are then brought together in one table:

TESTS IN MEXICO HIGH SCHOOL.

	Word building.	Logical memory.	Comple- tion test.	Substitu- tion test.	Opposites test.
Poor group.....	8.8	43.8	45.6	31.1	9.3
Good group.....	12.0	54.1	63.0	35.3	11.8
Good per cent. better*.....	36.0	23.0	39.0	13.0	24.0

*By "Good per cent. better" in these tables we express in per cent. the amounts by which the good groups excel the poor groups.

There were given at Mexico two word-building tests, with the letters o, e, u, b, n, r and a, e, i, c, h, s. There were four logical memory tests with the stories, *The Brave Korean*, *The Golden Goose*, *The Boy Who Would Not Drink* and *The Two Ways*. The four completion tests were: *The Dandelions*, *The Strength of the Eagle* and *Why the Mole Is Blind*, from Whipple, and *The Donkey and the Grasshopper* from Franz's *Handbook of Mental Examination Methods*. There were two substitution tests and three opposites tests, as described in the *Examination of School Children*.

TESTS IN KENNETT HIGH SCHOOL.

	Word- building.	Free asso- ciation.	Con- trolled asso- ciation.	Substi- tution.	Rote memory.	Logical memory.	Ink- blots.	Comple- tion test.
Poor group.....	14	50	12	31	40	39	9	47
Good group.....	18	59	13	35	46	48	8	59
Good per cent. better	28	18	8	11	15	23	—12	25

In addition to the same tests used at Mexico, there were tests of free association and the genus-species and part-whole tests of the controlled association tests, and tests of rote memory and the ink-blot test.

TESTS IN HANNIBAL HIGH SCHOOL.

	Substi- tution.	Controlled association.	Completion test.
Poor group.....	26.8	13.8	53.8
Good group.....	34.4	15.6	66.2
Good per cent. better.....	28.0	13.0	23.0

The three tests used at Hannibal were identical with the corresponding tests used at Kennett.

TESTS IN WESTPORT HIGH SCHOOL.

	Logical memory.	Controlled associa- tion.	Free associa- tion.	Rote memory.	Word- build- ing.	Sub- sti- tution.	Cancel- lation.
Poor group.....	34.5	29.5	21.5	41.0	11	24	26
Good group.....	46.0	37.8	23.0	42.0	13	28	26
Good per cent. better	33.0	28.0	7.0	2.4	18	17	0

The logical memory was the same four tests used at the other schools and *The Marble Statue* in addition. Controlled association did not include the opposites A, B and C. There was only one each of free association, word-building and substitution tests. The rote memory was the same as at Kennett, and the cancellation test was the A-test.

TESTS IN MT. WASHINGTON (GRADE SCHOOL).

The pupils in this school were compared in two tests only, the logical memory and completion tests. There were four tests in each. The logical memory tests were made in grades three, five and seven; the completion tests in grades four, five, six and seven. The best five and the poorest five in each grade were selected for comparison. In the memory tests two methods of selection were used. One selection was on the basis of the teacher's daily grades, the other on the basis of the average of four examination grades.

When the pupils were selected on the basis of the daily grades, the good groups made an average logical memory record 23.5 better than that made by the poor group. When the selection was on the basis of examination grades, the good group was found to be 22.6 better than the poor group.

In the completion test the good groups excelled the poor groups, as shown in the following table:

Grade	4	5	6	7
Good per cent. better.....	31.9	18.6	38	66

THE DISTRIBUTION OF ABILITY IN TWELVE-YEAR-OLD PUPILS.

In the Mexico schools forty-four pupils twelve years old were found to be distributed through four grades. These pupils were given simultaneously four logical memory tests, four completion tests, two word-building tests and four opposites tests. The results are shown in the following table:

Grade.	No. tested.	Com- pletion.	Logical memory.	Word- building.	Opposites.
4.....	4	17.8	22.2	3.5	2.5
5.....	10	41.6	33.0	8.5	6.4
6.....	23	50.4	34.2	6.6	7.9
7.....	7	59.9	42.5	7.5	9.4

It will be seen from the table that the twelve-year-old children in the upper grades have much greater ability than those in the lower grades.

If, instead of comparing the groups, we compare the individuals of the groups, we can learn how much overlapping there is between the groups. This I have done, and I find that 48 per cent. of the pupils making up the poor groups make a record as good as that of the lowest of the corresponding good groups. Twenty per cent. of the poor pupils make a grade as good as the average of the corresponding good groups. These figures are obtained by combining the results of the various tests. If only the more important tests, logical memory and completion tests, are considered, there is much less overlapping. In the completion test only a few of the poor pupils make the lowest grade of the good group, while a much smaller number—in many classes, none—made the average of the good groups. However, it is evident that some members of the poor groups belong to the good groups and some of the good groups belong among the poor groups.

A comparison of the ages of the pupils shows that the good pupils are a trifle more than a year younger than the poor pupils. At Kennett, the groups average the same age; at Hannibal, the good pupils average eight-tenths of a year younger; at Mexico, nine-tenths of a year, and at Westport High School, the good pupils are two and a half years younger.

There were more girls than boys in the groups studied. In

all there were fifty-four pupils in the good groups, twenty-two boys and thirty-two girls, while in the poor groups there were twenty-four boys and twenty-eight girls. There were, therefore, about 14 per cent. more boys, relatively, in the poor groups.

School.	Logical memory.	Rote memory.	Word building.	Completion.	Substitution.	Opposites (only).	Controlled association.	Free association.	Ink-blots.	Cancellation.
Mexico	23	...	36	39.0	13	24	..	...	..	..
Kennett	23	15.0	28	25.0	11	..	8	18.0	—12	..
Hannibal . . . . .	..	...	..	23.0	28	..	13	...	..	..
Westport H. S.	33	2.4	18	...	17	..	28	7.0	..	0
Mt. Washington Grade School.	23	...	..	15.2*	..	..	..	...	..	..
Averages	26	8.7	27	29.0	17	24	16	12.5	—12	0

*Not counted in the average.

The figures in the above table show how much the good group excelled the poor group in the various tests. They show the value of the different tests as one means of separating the dull from the bright pupils.

A study of the results shown in the preceding tables makes it clear that the mental differences between bright and dull pupils can be ascertained by means of simple group tests. The completion, word-building, logical memory and controlled association tests are evidently most valuable for this purpose. Ability to do the cancellation test has no relation to the abilities shown in the other tests. Several other recent experiments of the writer sustain this conclusion. In some tests it seems to show an inverse relation to the other tests. The results of the ink-blot test also show a negative relation to the other tests. Ability to do well in this test is clearly related to age, young children doing better. It is possible that the dull high school pupils are more like younger children; possibly they are merely uncritical.

The practical outcome of this study is that mental tests can be made very valuable to teachers, principals and superintendents in getting supplementary evidence of pupils' abilities. And this additional evidence will be especially helpful in deal-

ing with the apparently bright and the apparently stupid. Some pupils that seem to be dull are not dull, but are the victims of circumstances. And sometimes the apparently bright pupil is only mediocre, but has succeeded because of unusually favorable opportunities. Sometimes the differences between pupils is only one of laziness. Different habits of study may at other times be the cause. In all cases careful mental tests will give valuable additional information. In teaching children and advancing them through the grades of the public school, all information about them that can be secured should be utilized.

The writer is under great obligation to several teachers who co-operated in the study. The tests were administered by Principal B. T. Ritter, at Mt. Washington; Miss Eleanor Klee-man, at the Westport High School; Miss Aretta Watts, at Hannibal; Miss Margery Graham, at Kennett; by Misses Gill and Mason and Mr. Bruner, at Mexico. Most of these teachers are graduates of this university, and all had been trained for the work in our laboratory.

THE VALUE OF THE BINET MENTAL AGE TESTS FOR FIRST GRADE ENTRANTS.

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In May and June of 1913 the entire membership of a certain Oakland kindergarten were given Terman's adaptation of the Binet mental age tests. The purpose was to discover whether there was any correlation possible between such tests and the progress of the subjects during their first year of school. If such tests proved to be prophetic, could they be rendered of service in fitting school entrants to their environment?

The school in which the kindergarten was located was a large school in one of the worst parts of town, where there is a mixture of Portuguese, Italians and colored, where poverty is considerable, and where moral conditions are bad.

The following were the results secured, together with information concerning nationality, families, employment of fathers, etc.:

TABLE I.

	Men- Age. tality.	Nationality.	Father's employment.	Family, etc.
1. Lawrence P.....	5.71 + 1.7	American.	Bridge Inspector.	Good.
2. Lillian McM.....	5.6 + 1.59	Irish-American.	Foundry.	Good.
3. Rosa V.....	5.17 + 1.59	Port. Isl.	Secretary.	
4. Joe M.....	5.66 + 1.08	Port.	Laborer.	Two older girls subnormal. Poor.
5. Gladys P.....	5.47 + 1.01	Colored.	Porter.	
6. Frances T.....	6. + .96	Colored.	Cook.	
7. Agnes F.....	5.46 + .42	?	?	
8. Freda N.....	5.97 + .36	German Jew.	?	
9. Norman O.....	5.15 + .32	?	?	
10. Dorothy L.....	5.5 + .29	Swedish.	Carpenter.	
11. Manual J.....	5.77 + .08	Syrian.	Storekeeper.	Older children subnormal. Dirty.
12. Emily D.....	5.46 + .06	?	?	
13. Helen D.....	5.92 — .02	Polish.	Carpenter.	
14. Chas. T.....	5.7 — .23	Austrian.	Butcher.	Older brother quite subnormal. Very bad boy.
15. Cardwell T.....	5.33 — .32	Colored.	Porter.	
16. Katie V.....	5.93 — .44	Austrian.	Janitor.	
17. Fulvia V.....	4.83 — .55	Italian.	Cannery.	
18. Robert L.....	5.5 — .6	American.	Retired.	
19. Frances W.....	5.51 — .69	?	?	
20. Dunco M.....	5.4 — .93	Austrian.	Car cleaner.	
21. Mary B.....	5.93 — .98	Italian.	Laborer.	
22. Ethel G.....	5. — 1.	English.	Father divorced.	Mo. insane; one brother f. m.; one bad.
23. Angelina F.....	7. — 1.28	Italian.	Laborer.	
24. Catherine P.....	6.6 — 1.36	Unknown.	(Institut. child.)	
25. Ionella L.....	6.54 — 1.49	American.	Railroad clerk.	
26. Geo. Gardner....	6.84 — 1.6	(See No. 22.)		
27. Joe P.....	7.17 — 1.87	Port. Isl.	Saloon.	
28. Manuel F.....	7.16 — 1.97	Port. Isl.	Railroad yards.	
29. August R.....	6.3 — 2.	Port. Isl.	Laborer.	
30. Tony F.....	6.95 — 2.49	Port.	Railroad.	
31. Joe F.....	6.77 — 3.14	Port.	Carpenter.	
32. Joe S.....	7.17 — 4.05	Port.	Mo. in cannery.	Poor and dull.
33. Katherine Van...	7.	Sent to home for f. m.;	father insane; brother f. m.	
34. Lew S.....	6.2	Had not enough English to answer anything, but would have tested above age.		

From the first two columns the mental quotient¹ was computed, as follows:

TABLE II.

1... 1.29	7... 1.07	13... .99	19... .87	25... .77	31... .53
2... 1.28	8... 1.06	14... .96	20... .82	26... .76	32... .43
3... 1.30	9... 1.06	15... .95	21... .83	27... .73	
4... 1.19	10... 1.05	16... .92	22... .80	28... .72	
5... 1.18	11... 1.01	17... .88	23... .81	29... .68	
6... 1.16	12... 1.00	18... .88	24... .79	30... .64	

We find that numbers 3 and 23 show a discrepancy with the mental acceleration and retardation in column 3. Number 3 is markedly younger than those just above her, and so her percentage of advance on her actual age is necessarily greater. Similarly, number 23 is much older than the child just above her, and her retardation is less in proportion to her years.

In general, the following facts are noticeable from the original examinations as given in the first three columns:

1. Out of 34 children, 13 tested mentally above their physical age.
2. Making allowance for foreign birth and poor environment, one may safely say that half of the class were of right mental age or over.
3. Calculating by the mental quotient, we find that half of the class showed a mental efficiency of over 90 per cent.
4. If we take all children as normal who tested within one year of their right mental age, we find one-half of the class normal, one-half either below or above normal.
5. But the one-half above and below are not equally divided. They are in the relation of, above: below::5:12. That is, the distribution of the level of intelligence hardly corresponds with the results of Binet, Bobertag and Goddard. The comparison would be as follows:

TABLE III.

Bobertag	Above	: below	:: 25	: 22	:: 1	: .88
Goddard	Above	: below	:: 27	: 31.5	:: 1	: 1.17
Binet	Above	: below	:: 21.5	: 27.5	:: 1	: 1.28
Hicks	Above	: below	:: 5	: 12	:: 1	: 2.40

¹See WILLIAM STERN. *The Psychological Methods of Testing Intelligence*. Baltimore: Warwick & York, 1914.

This discrepancy might arise from the conditions of poverty and wrong living represented in this particular kindergarten class.

6. Figures on sex agreed with the usual fact of a majority of males among the exceptional. Of 16 boys and 18 girls in the class, 5 boys were mentally in advance of their age, and 8 girls. Of the 12 children more than one year retarded 7 were boys.

7. Nationality did not seem to be of particular importance. Of the American, 3 were above age (counting number 7 and number 9), and 4 American or English were below. However, there is a larger number of Portuguese represented among the ones far down on the scale, and also a larger number of day laborers.

8. The limiting age in our kindergartens is supposed to be 6 years. Every child more than 1 year retarded mentally was over 6; and of all the children who were over 6, all but 2 were more than 1 year retarded. One of these two was the Chinese boy who did not speak English, number 34.

9. At the time of examining it was agreed by teacher and psychologist that number 15 was of the moral imbecile type; that numbers 18, 25, 26, 30, 32 and 33 were feeble-minded, and that number 22 was questionable. The mother of number 18 has probably falsified his age record. Last year he was recorded as 6.5 years, but this year she has dropped a year.

The above were the facts apparent from the first study of the class. Now, a year later, they have been investigated again, to discover just what progress they have made, and whether that progress corresponds with results of last year's examination. The first column gives the child's number; the second, his acceleration or retardation; the third, his present grade; the fourth, the date on which he entered his present grade; the fifth, the date on which, according to his physical age, he should have entered his present grade; the sixth, the teacher's judgment on his progress.

Numbers 12, 19, 22 are eliminated for lack of recent data, and numbers 33 and 34 because the former entered a State institution and the latter did not have English enough to be tested a year ago,—leaving 29 children.

TABLE IV.

No.	Accel.	Grade.	Should have		Progress.
			Entered.	entered.	
1	1.7	1B	Jan. 14	Aug. 14	Good beyond average.
2	1.59	1B	Jan. 13	Aug. 13	Good beyond average. (Has gone to another school.)
3	1.59	Kdg.	Jan. 13	Aug. 13	(Despite high mental rating, this little colored girl has had to remain in kindergarten over a year. She has now barely reached the place where she can progress into 1A—where she belongs by physical age.) A liar.
4	1.08	1A	Jan. 14	Jan. 14	Very slow, but intelligent. Will pass into 1B by giving him special attention.
5	1.01	1A	Jan. 14	Jan. 14	Very slow, but intelligent. Will pass into 1B by giving him special attention.
6	.96	1A	Aug. 13	Aug. 13	Must stay in 1A all this year because of marked lack of application.
7	.42	?			Moved out of town, but entered 1A in August 13, and progressed normally as long as in school.
8	.36	1B	Jan. 14	Jan. 14	Thoroughly good progress.
9	.32	?			Same as No. 7.
10	.29	1A	Jan. 14	Jan. 14	Normal progress, not brilliant.
11	.08	1A	Jan. 14	Jan. 14	Will pass into 1B at end of year only with special help.
12	.06	?			(Sent home for pediculosis before Christmas and has never returned. Fair progress while in school.)
	Ret.				
13	.02	1B	Mar. 14	Jan. 14	Capable, but pretty slow.
14	.23	1A	Jan. 14	Jan. 14	Normal progress.
15	.32	1A	Jan. 14	Aug. 14	Better behaved. Has made some progress, but cannot pass without special help.
16	.44	1A	Jan. 14	Aug. 13	Irregular. Does poor work. Will not be promoted.
17	.55	Kdg.	Jan. 13	Aug. 13	Has progressed little in kindergarten in 1½ years, but will be promoted to 1A.
18	.6	1A	Jan. 14	Jan. 14	This boy was in the special class for some months in the fall, making little progress. His mother is deeply mortified at his being classed with defectives, so he has been allowed to try 1A work. He has done nothing and cannot possibly be promoted. His real age is probably one year more than indicated, which would change his place on the list from 18 to 26.
19	.69				(Has gone into convent school; no record.)
20	.93	Kdg.	Jan. 13	Jan. 13	Apparently no progress during his first half-year in kindergarten, but this year has done well and will enter 1A.

21	.98	1A	Aug. 13	Aug. 13	Teacher reports normal progress at present, yet she will have spent a year in doing 1A work.
22	1.				Out of school most of this year with Hawaiian itch. The insane mother has little idea of care for the children. While in kindergarten the child was below normal in progress, yet impressed one with the probability of better work if she were in a different environment.)
23	1.28	1A	Aug. 13	Aug. 12	Has been reported as normal and will be promoted in June. But has taken a whole year to do one term's work. According to physical age, she should now be finishing 2B. Parents may have lied about age, making her a year too old. She is very tiny, and this is common with Italians.
24	1.36	1A	Aug. 13	Jan. 13	Less than normal progress even yet. May not leave 1A even in June.
25	1.49				Has been out of school most of time because too feeble-minded even to improve by kindergarten instruction.
26	1.6				(See No. 22. This boy is lower grade than No. 22; undoubtedly feeble-minded.)
27	1.87	1A	Aug. 13	Aug. 12	Has spent whole year in doing one term's work, and has just a chance of promotion.
28	1.97	1B	Jan. 14	Jan. 13	The only one who tested below mental age who entered the grades regularly and has progressed regularly. He is reported as normal by his teacher.
29	2.	1A	Jan. 14	Aug. 13	This boy has a chance to be promoted this June if his teacher gives him special attention, but not without.
30	2.49	1A	Aug. 13	Aug. 12	Just a bare possibility of his being promoted in June after spending one year doing one term's work. Age?
31	3.14	1A	Aug. 13	Jan. 13	Vocabulary difficulties keep him below grade, yet he will probably be promoted in June, after a year in 1A.
32	4.05	Spec.	Aug. 13	Aug. 12	Undoubtedly feeble-minded. Progress poor, yet better than No. 18 while in the special class, and better than would have been at all possible in regular class work.
33					Moral imbecile. Sent to State home for feeble-minded as impossible.
34	?	1A	Jan. 14	Aug. 13	Perfectly normal progress since he acquired enough English to get along.

TABLE V.

In the following table are given the dates at which each child by physical age should have entered 1A, 1B and 2A; the dates at which he should have done so according to mental age, and the dates at which he actually did so:

No.	Dates of entering 1A, 1B, 2A by physical age.	By mental age.	Actual dates of entering.
1.	Jan. 14—Aug. 14—Jan. 15	Jan. 12—Aug. 12—Jan. 13	Aug. 13—Jan. 14—Aug. 14
2.	Jan. 14—Aug. 14—Jan. 15	Aug. 12—Jan. 13—Aug. 13	Aug. 13—Jan. 14—Aug. 14
3.	Aug. 14—Jan. 15—Aug. 15	Jan. 13—Aug. 13—Jan. 14	Aug. 14
4.	Jan. 14—Aug. 14—Jan. 15	Jan. 13—Aug. 13—Jan. 14	Jan. 14—Aug. 14 (spec. help)
5.	Jan. 14—Aug. 14—Jan. 15	Jan. 13—Aug. 13—Jan. 14	Jan. 14—Aug. 14 (spec. help)
6.	Aug. 13—Jan. 14—Aug. 14	Aug. 12—Jan. 13—Aug. 13	Aug. 13—Aug. 14
7.	Jan. 14—Aug. 14—Jan. 15	Aug. 13—Jan. 14—Aug. 14	Aug. 13—Jan. 14—Aug. 14
8.	Aug. 13—Jan. 14—Aug. 14	Jan. 13—Aug. 13—Jan. 14	Aug. 13—Jan. 14—Aug. 14
9.	Aug. 14—Jan. 15—Aug. 15	Jan. 14—Aug. 14—Jan. 15	Aug. 13—Jan. 14—Aug. 14
10.	Jan. 14—Aug. 14—Jan. 15	Jan. 14—Aug. 14—Jan. 15	Jan. 14—Aug. 14
11.	Jan. 14—Aug. 14—Jan. 15	Aug. 13—Jan. 14—Aug. 14	Jan. 14—Aug. 14 (spec. help)
12.	Jan. 14—Aug. 14—Jan. 15	Jan. 14—Aug. 14—Jan. 15	?
13.	Aug. 13—Jan. 14—Aug. 14	Aug. 13—Jan. 14—Aug. 14	Aug. 13—Mar. 14
14.	Jan. 14—Aug. 14—Jan. 15	Jan. 14—Aug. 14—Jan. 15	Jan. 14—Aug. 14
15.	Jan. 14—Aug. 14—Jan. 15	Aug. 14—Jan. 15—Aug. 15	Jan. 14—Aug. 14 (spec. help)
16.	Jan. 14—Aug. 14—Jan. 15	Jan. 14—Aug. 14—Jan. 15	Jan. 14
17.	Aug. 14—Jan. 15—Aug. 15	Aug. 15—Jan. 16—Aug. 16	Aug. 14
18.	Jan. 14—Aug. 14—Jan. 15	Aug. 14—Jan. 15—Aug. 15	Jan. 14 X (Institutional)
19.	Jan. 14—Aug. 14—Jan. 15	Aug. 14—Jan. 15—Aug. 15	?
20.	Jan. 14—Aug. 14—Jan. 15	Jan. 15—Aug. 15—Jan. 16	Aug. 14
21.	Aug. 13—Jan. 14—Aug. 14	Aug. 14—Jan. 15—Aug. 15	Aug. 13—Aug. 14
22.	Aug. 14—Jan. 15—Aug. 15	Aug. 15—Jan. 16—Aug. 16	?
23.	Aug. 12—Jan. 13—Aug. 13	Jan. 14—Aug. 14—Jan. 15	Aug. 13—Aug. 14
24.	Jan. 13—Aug. 13—Jan. 14	Aug. 14—Jan. 15—Aug. 15	Aug. 13—Aug. 14 (spec. help)
25.	Jan. 13—Aug. 13—Jan. 14	Aug. 14—Jan. 15—Aug. 15	?
26.	Aug. 12—Jan. 13—Aug. 13	Aug. 14—Jan. 15—Aug. 15	X
27.	Aug. 12—Jan. 13—Aug. 13	Aug. 14—Jan. 15—Aug. 15	Aug. 13 X ?
28.	Aug. 12—Jan. 13—Aug. 13	Aug. 14—Jan. 15—Aug. 15	Aug. 13—Aug. 14 (spec. help)
29.	Aug. 13—Jan. 14—Aug. 14	Aug. 15—Jan. 16—Aug. 16	Aug. 13—Jan. 14—Aug. 14
30.	Aug. 12—Jan. 13—Aug. 13	Jan. 15—Aug. 15—Jan. 16	Jan. 14—Aug. 14 (spec. help)
31.	Jan. 13—Aug. 13—Jan. 14	Jan. 16—Aug. 16—Jan. 17	Aug. 13—Aug. 14 (spec. help)
32.	Aug. 12—Jan. 13—Aug. 13	Aug. 16—Jan. 17—Aug. 17	Aug. 13—Aug. 14
33.	Aug. 12—Jan. 13—Aug. 13	X	Aug. 13 X
34.	Aug. 13—Jan. 14—Aug. 14	?	X
			Jan. 14—Aug. 14

TABLE VI.—SUMMARY.

		Progress.		Retarded. 1	Failed. 0
		Normal. 2	Slow— not ret. 3		
Entered at right physical age 13	By mental age should have entered	Before 6			
		Same 3	2	1	0
		After 4	1	1	1
Entered at right mental age 5	By physical age should have entered	Before 1	0	0	1
		Same 3	2	1	0
		After 1	1	0	0
Entered at neither right physical nor mental age 14	Entered between mental and physical age 13		5	1	5
		Entered before either mental or physical age 1	1		3

Calculating these figures in per cents., it appears that:

TABLE VII.

	Normal progress. Per cent.	Less than normal progress. Per cent.
Entering at right physical age.....	37 6/13	62 7/13
Entering at right mental age.....	60	40
Entering at neither age.....	35 5/7	64 2/7
And of the whole class.....	44 24/29	55 5/29

A few facts may be gleaned even from these small numbers. It is apparent that when an entrant into first grade does not correspond either mentally or physically with the commonly accepted age of 6 years, his chances of normal progress are about as 1:2. If he enters at the right physical age, his chances are not greatly increased, whereas if he enters at the right mental age his chances are as 3:2. (The only child of this group who failed is number 16, a case of great irregularity of attendance.)

Suppose, for the sake of the argument, that this class of 34 children had been divided according to the judgment of the examining psychologist and the teacher and given such training as they seemed to demand. Then in August of 1913 there would have entered the grades (1A) the following: numbers 1, 2, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14. Under ideal conditions the following would have been sent to institutions for the feeble-minded: numbers 25, 26, 32, 33. Numbers 3, 17, 20, 22 would have remained in kindergarten. Numbers 15, 16, 18, 19, 21, 23, 24, 27, 28, 29, 30, 31, 34 would have been put into a special class.

If this plan had been followed, certain errors would have developed. Six out of the 13 would not have been able to make the progress expected of them when they were allowed to enter first grade. Of those relegated to kindergarten, the year's experience has proved that all were wise choices. There can have been no question about the feeble-minded, though so far only 1 has been sent. Now, of the children designated for the special class, 28 and 34 would soon have shown that they could carry grade work, language difficulties being overcome, and would have been placed in first grade without any retardation. Of the others, there would have been a good chance that the stimulation of a special class would have made nearly normal progress possible for numbers 16, 21, 23, with a fighting chance for number 31. The others may need special class work for a long time to come.

Let us compute the comparative expense of the ideal plan for this past year and the one actually followed. Suppose that the unit expense of a child in a regular class is $1/42$. There were 13 cases of taking double time for a term's work, or $13/42$. With an attendance of 14 in the special class, the unit

of expense is $1/14$. There would have been an average of $9/14$ for the year. Roughly, the expense for the first plan would have been about one-half that of the ideal condition. But this does not take into account the frequency of extra help to those who went into the regular classes. This was recorded by teachers for 13 cases. All of such extra assistance must be calculated as taking just so much of the teacher's time and energy from the average pupils, and has a money value which is no less real because it is hard to compute.

Now, the actual distribution at the present time is as follows:

Class A (1B)—Numbers 1, 6, 8, 13, 28. (Moved, but of same progress—numbers 2, 7, 9.)

Class B (1A)—Numbers 4, 5, 10, 11, 14, 15, 29, 34.

Class C (1A)—Numbers 16, 18, 21, 23, 24, 27, 30, 31 (and in this same class is another group of subnormals who do not appear in the kindergarten list, so that the teacher is actually endeavoring to teach nearly three times as many subnormals as would be placed in a special class, and mixed in with a few normal children as well).

Class D (Kdg.)—Numbers 3, 17, 20.

Institution—Number 33.

Special class—Number 32.

Out of school—Numbers 12, 22, 25, 26, 19.

CONCLUSIONS.

1. The school examined is marked by unusual conditions of mental deficiency of varying degrees.
2. The Binet tests given to entrants to first grade would not result in any unjust labeling of them as mental defectives.
3. The most evident fault of the tests if used as prognosticative of school progress is over-optimism.
4. The chief value of giving the tests would be in having them productive of proper distribution of entrants according to ability, into regular classes, classes for the slow but intelligent, special classes for subnormal, expulsion for feeble-minded.
5. Where such considerable mental deficiency is found among first grade entrants, the school curriculum should be elastic, and should contain much industrial training, coupled with effort to reach the school children socially.

THE MEASUREMENT OF EFFICIENCY IN SPELLING, AND THE OVERLAPPING OF GRADES IN COM- BINED MEASUREMENTS OF READING, WRITING AND SPELLING.

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Methods of Testing. On first thought it would seem to be an easy matter to test spelling capacity by simply finding out how many words of a given list a person can spell correctly. The difficult problem, however, is the selection of a list of test words which shall test fairly and adequately any person's spelling ability, and which shall be equivalent in value, or, at least, shall have a known value. A number of extensive investigations of spelling have been made, but all of them, with the exception of the studies made by Ayres¹ and Buckingham,² have been made with arbitrarily selected words. To be sure, they were selected on good judgment for the purposes for which they were to be used, but, nevertheless, they were arbitrary and of unknown value as means of determining spelling capacity or attainment.

Rice,³ in his pioneer study, used a sentence test containing seventy-five test words, a column test composed of fifty words, and a composition test in which the pupils wrote compositions on topics connected with their school studies. Cornman⁴ later used Rice's column and composition tests, and also a test in which the pupils wrote as many words as they could in fifteen

¹LEONARD P. AYRES. *The Public Schools of Springfield, Illinois.* Russell Sage Foundation, New York.

²B. R. BUCKINGHAM. *Spelling Ability.* Columbia University.

³J. M. RICE. *The Futility of the Spelling Grind.* The Forum, 1897.

⁴O. P. CORNMAN. *Spelling in the Elementary School.* 1902. Boston.

minutes. They were allowed to write any words that came to their minds. Wallin,⁵ in his investigation of spelling in Cleveland, employed a dictated composition test containing specified test words and a column test composed of a different set of forty or more words for each grade.

The chief criticisms of these methods are (1) that it is impossible to make valid comparisons of grade with grade or school with school when a different list is used for each grade whose relative difficulty is entirely unknown. It is, therefore, futile to say that one school or grade spells as well as, or better than, or worse than another. Yet such comparisons are made frequently in the studies referred to. (2) The composition test is of little value because the pupil is free to select his own words. He is quite sure to avoid the use of words concerning whose spelling he is uncertain. The same criticism applies to Cornman's fifteen-minute test. (3) The dictated-sentence test has the same fault as the column test. The words are more or less arbitrary and, when a different set of test words is used for each grade, comparisons are impossible.

More recently the lists compiled by Ayres and by Buckingham represent real attempts to select test words on a scientific basis. Ayres' list is composed of a set of ten words for each grade from the second to the eighth. Each set of ten was so selected, on the basis of previous tests, that seven out of ten children of a grade on an average can spell correctly all the words designed for that grade. The lists are as follows:

2d grade.	3d grade.	4th grade.	5th grade.	6th grade.	7th grade.	8th grade.
foot	fill	forty	several	decide	district	petrified
get	point	rate	leaving	general	consideration	tariff
for	state	children	publish	manner	athletic	emergency
horse	ready	prison	o'clock	too	distinguish	corporation
cut	almost	title	running	automobile	evidence	convenience
well	highly	getting	known	victim	conference	receipt
name	event	need	secure	hospital	amendment	cordially
room	done	throw	wait	neither	liquor	discussion
left	pass	feel	manner	toward	experience	appreciate
with	Tuesday	speak	flight	business	receive	decision

⁵J. E. W. WALLIN. *Spelling Efficiency*. Warwick & York, Baltimore.

These words have the advantage of being made up of words of known difficulty. There are, however, three points that should be considered. (1) The lists are so small that the chance of familiarity or unfamiliarity on the part of individual pupils with these particular words is rather large. The result is that, while the words no doubt have validity for testing a grade or class as a whole, they are apt to be quite unreliable as a test of individual pupils. (2) As a result of the manner in which the words were selected, they are sure to be too easy for the better pupils of each grade, and hence they would not test the spelling ability of such pupils. By definition, seven out of ten pupils can spell correctly all the words assigned to their grade. (3) It is impossible to measure grade-to-grade progress with objective certainty, because the relative difficulty of the lists for the different grades is unknown.

Buckingham selected, on the basis of a series of tests, two lists of twenty-five words each of known difficulty. These are arranged on a scale of increasing value, as follows:

1st List.		2d List.	
only	freeze	chicken	against
even	forty	butcher	circus
smoke	wear	Tuesday	guess
front	minute	answer	telephone
another	pear	raise	choose
lesson	button	beautiful	telegram
bought	janitor	instead	saucy
pretty	sword	tailor	already
nails	whistle	tying	pigeons
sure	stopping	towel	beginning
nor	carriage	tobacco	grease
cousin	saucer	whole	too
touch		quarrel	

The relative values of these words have been determined quite accurately. A child's spelling capacity would be measured by determining the number of words he can spell correctly and then assigning to him a score on the basis of the values of the words spelled. Criticisms (1) and (2) made in connection with the Ayres list apply here also. The force of the second criticism is shown by the distribution curves of spelling ability as published by Buckingham. The words are too easy for the better pupils even as far down as the fourth

grade. In the upper grades more and more of the pupils can spell correctly all the words in the list until in the eighth grade more than half of the pupils can spell all of the words correctly. A third point, perhaps a minor one, is that the scoring, if it is to be done accurately, is rather difficult.

The method for testing efficiency in spelling which is proposed here, and which has been used in this investigation, will be described first. The various critical points concerning its validity and accuracy will be considered later.⁶ The words were selected in the following manner: The first defined word on every even-numbered page in Webster's New International Dictionary (1910 edition) was chosen, making a total of 1186 words. From these all technical, scientific and obsolete words were discarded, which left 612 words. Finally, 12 other words which approached most closely to being technical or obsolete were discarded, so as to leave 600 words. These were then arranged alphabetically in the order of size, beginning with 3-letter words, 4-letter words, etc., down to the longest words. This list was then divided into six lists of 100 words each by choosing for the first list, the 1st, 7th, 13th, etc.; for the second list, the 2d, 8th, 14th, etc.; for the third list, the 3d, 9th, 15th, etc.; for the fourth list, the 4th, 10th, 16th, etc.; for the fifth list, the 5th, 11th, 17th, etc., and for the sixth list, the 6th, 12th, 18th, etc. The lists resulting from this process are as follows:

⁶This investigation was begun before the studies of Ayres and Buckingham were published. Consequently their methods were not taken into account.

FIRST LIST.

- | | | |
|-----------|--------------|---------------------|
| 1. add | 35. prism | 69. commence |
| 2. but | 36. rogue | 70. estimate |
| 3. get | 37. shape | 71. flourish |
| 4. low | 38. steal | 72. luckless |
| 5. rat | 39. swain | 73. national |
| 6. sun | 40. title | 74. pinnacle |
| 7. alum | 41. wheat | 75. reducent |
| 8. blow | 42. accrue | 76. standing |
| 9. cart | 43. bottom | 77. venturer |
| 10. cone | 44. chapel | 78. ascension |
| 11. easy | 45. dragon | 79. dishallow |
| 12. fell | 46. filter | 80. imposture |
| 13. foul | 47. hearse | 81. invective |
| 14. gold | 48. laden | 82. rebellion |
| 15. head | 49. milden | 83. scrimping |
| 16. kiss | 50. pilfer | 84. unalloyed |
| 17. long | 51. rabbit | 85. volunteer |
| 18. mock | 52. school | 86. cardinally |
| 19. neck | 53. shroud | 87. connective |
| 20. rest | 54. starch | 88. effrontery |
| 21. spur | 55. vanity | 89. indistinct |
| 22. then | 56. bizarre | 90. nunciature |
| 23. vile | 57. compose | 91. sphericity |
| 24. afoot | 58. dismiss | 92. attenuation |
| 25. black | 59. faction | 93. fulminating |
| 26. brush | 60. hemlock | 94. lamentation |
| 27. close | 61. leopard | 95. secretarial |
| 28. dodge | 62. omnibus | 96. apparitional |
| 29. faint | 63. procure | 97. intermissive |
| 30. force | 64. rinsing | 98. subjectively |
| 31. grape | 65. splashy | 99. inspirational |
| 32. honor | 66. torpedo | 100. ineffectuality |
| 33. mince | 67. worship | |
| 34. paint | 68. bescreen | |

SECOND LIST.

- | | | |
|-----------|--------------|---------------------|
| 1. air | 35. quill | 69. covenant |
| 2. cat | 36. rough | 70. eugenics |
| 3. hop | 37. shout | 71. friskful |
| 4. man | 38. stick | 72. luminous |
| 5. row | 39. swear | 73. opulence |
| 6. tap | 40. trump | 74. planchet |
| 7. awry | 41. whirl | 75. reformer |
| 8. blue | 42. action | 76. thorough |
| 9. cast | 43. bridle | 77. watering |
| 10. corn | 44. charge | 78. belonging |
| 11. envy | 45. driver | 79. displayed |
| 12. feud | 46. finger | 80. indention |
| 13. game | 47. heaven | 81. mercenary |
| 14. grow | 48. legend | 82. redevelop |
| 15. home | 49. motley | 83. sensecent |
| 16. knee | 50. portal | 84. uncharged |
| 17. look | 51. recipe | 85. whichever |
| 18. mold | 52. scrape | 86. centennial |
| 19. part | 53. simple | 87. constitute |
| 20. ruin | 54. strain | 88. exaltation |
| 21. take | 55. weaken | 89. invocative |
| 22. tree | 56. breaker | 90. personable |
| 23. well | 57. congeal | 91. strawberry |
| 24. allay | 58. disturb | 92. concentrate |
| 25. blaze | 59. foreign | 93. imaginative |
| 26. buggy | 60. hoggerly | 94. mathematics |
| 27. clown | 61. meaning | 95. selfishness |
| 28. doubt | 62. onerate | 96. collectivity |
| 29. false | 63. provoke | 97. marriageable |
| 30. forth | 64. salient | 98. agriculturist |
| 31. grass | 65. station | 99. quarantinable |
| 32. house | 66. trample | 100. relinquishment |
| 33. money | 67. abstract | |
| 34. paper | 68. bulletin | |

THIRD LIST.

- | | | |
|-----------|--------------|---------------------|
| 1. art | 35. razor | 69. dominate |
| 2. dry | 36. saint | 70. exchange |
| 3. ice | 37. smell | 71. governor |
| 4. mix | 38. stock | 72. manifest |
| 5. run | 39. swoop | 73. osculate |
| 6. top | 40. twine | 74. pleasure |
| 7. back | 41. white | 75. revising |
| 8. bond | 42. barrel | 76. traverse |
| 9. chip | 43. buckle | 77. westward |
| 10. crib | 44. cotton | 78. capitally |
| 11. ever | 45. engine | 79. extremism |
| 12. fire | 46. flimsy | 80. indicated |
| 13. gilt | 47. helmet | 81. monoplane |
| 14. hack | 48. lesser | 82. repertory |
| 15. hunt | 49. ocular | 83. stimulate |
| 16. lace | 50. potato | 84. unlocated |
| 17. main | 51. relate | 85. accidental |
| 18. more | 52. season | 86. citizenize |
| 19. pelt | 53. single | 87. contribute |
| 20. sand | 54. supply | 88. expertness |
| 21. tang | 55. weight | 89. locomotive |
| 22. turn | 56. captain | 90. prevailing |
| 23. wine | 57. contour | 91. symmetrize |
| 24. amuse | 58. earnest | 92. consolatory |
| 25. blind | 59. fowling | 93. incremental |
| 26. catch | 60. inflate | 94. penetrative |
| 27. count | 61. measure | 95. superintend |
| 28. dress | 62. palaver | 96. conterminous |
| 29. fancy | 63. raising | 97. naturalistic |
| 30. freak | 64. seizing | 98. artificiality |
| 31. gross | 65. sulphur | 99. re-examination |
| 32. inlet | 66. trestle | 100. sentimentalism |
| 33. muddy | 67. adhesive | |
| 34. peace | 68. buttress | |

FOURTH LIST.

- | | | |
|-----------|--------------|---------------------|
| 1. bee | 35. remit | 69. enabling |
| 2. elk | 36. scale | 70. external |
| 3. key | 37. speak | 71. greeting |
| 4. new | 38. stone | 72. mosquito |
| 5. saw | 39. thick | 73. outfling |
| 6. war | 40. under | 74. positive |
| 7. base | 41. widen | 75. romantic |
| 8. book | 42. bearer | 76. undulate |
| 9. clue | 43. canine | 77. adverbial |
| 10. down | 44. create | 78. carpentry |
| 11. fall | 45. eraser | 79. franchise |
| 12. flat | 46. garret | 80. infatuate |
| 13. girt | 47. hollow | 81. promenade |
| 14. hand | 48. little | 82. rigmarole |
| 15. iron | 49. office | 83. stripping |
| 16. lime | 50. prince | 84. vegetable |
| 17. make | 51. retain | 85. assignment |
| 18. move | 52. settle | 86. comparison |
| 19. plug | 53. sluice | 87. coordinate |
| 20. shop | 54. swerve | 88. expressage |
| 21. tear | 55. withal | 89. mayonnaise |
| 22. tusk | 56. chicken | 90. recompense |
| 23. wire | 57. counter | 91. untraveled |
| 24. apple | 58. emperor | 92. consumptive |
| 25. blood | 59. freight | 93. infuriation |
| 26. chain | 60. journal | 94. photosphere |
| 27. craft | 61. neglect | 95. terrestrial |
| 28. drawn | 62. passion | 96. horsemanship |
| 29. field | 63. reserve | 97. regenerative |
| 30. frost | 64. serpent | 98. circumscribed |
| 31. guard | 65. surface | 99. sculpturesque |
| 32. jelly | 66. trouble | 100. verisimilitude |
| 33. ocean | 67. affected | |
| 34. pitch | 68. calendar | |

FIFTH LIST.

- | | | |
|-----------|--------------|----------------------|
| 1. bow | 35. revel | 69. entirely |
| 2. fly | 36. scorn | 70. farewell |
| 3. law | 37. spire | 71. incident |
| 4. old | 38. strut | 72. mountain |
| 5. see | 39. three | 73. parallel |
| 6. ache | 40. voice | 74. prelimit |
| 7. bead | 41. vince | 75. spectral |
| 8. call | 42. beaver | 76. urbanize |
| 9. cold | 43. cannon | 77. aggrieved |
| 10. draw | 44. crispy | 78. clarifier |
| 11. fast | 45. escape | 79. hydraulic |
| 12. foil | 46. gladly | 80. inheritor |
| 13. glue | 47. hustle | 81. purgation |
| 14. hard | 48. mallet | 82. sacrifice |
| 15. jack | 49. oriole | 83. surviving |
| 16. line | 50. pulley | 84. vestibule |
| 17. mark | 51. rubric | 85. authorship |
| 18. musk | 52. shears | 86. concoction |
| 19. prig | 53. solace | 87. derigation |
| 20. slat | 54. trifle | 88. federative |
| 21. test | 55. yellow | 89. memorandum |
| 22. vend | 56. circuit | 90. regularity |
| 23. wood | 57. crooked | 91. abnormality |
| 24. armor | 58. enstamp | 92. disseminate |
| 25. boast | 59. general | 93. insensitive |
| 26. chase | 60. lateral | 94. predominate |
| 27. cross | 61. nourish | 95. unprevented |
| 28. enjoy | 62. placard | 96. inarticulate |
| 29. fixed | 63. resolve | 97. stupendously |
| 30. glean | 64. signify | 98. communicating |
| 31. guild | 65. tabloid | 99. anthropometric |
| 32. joint | 66. unitive | 100. emancipationist |
| 33. order | 67. approved | |
| 34. point | 68. cerebral | |

SIXTH LIST.

- | | | |
|-----------|--------------|-----------------------|
| 1. box | 35. river | 69. erosible |
| 2. gap | 36. shaft | 70. fetching |
| 3. lay | 37. stall | 71. juncture |
| 4. pod | 38. sugar | 72. narcotic |
| 5. sex | 39. throw | 73. parasite |
| 6. alms | 40. watch | 74. probator |
| 7. bird | 41. young | 75. squeaker |
| 8. camp | 42. begird | 76. vagabond |
| 9. comb | 43. causal | 77. amphibian |
| 10. dusk | 44. discs | 78. clearness |
| 11. fear | 45. ferret | 79. impatient |
| 12. foot | 46. gutter | 80. intestine |
| 13. goat | 47. killed | 81. quadruple |
| 14. hawk | 48. middle | 82. sauciness |
| 15. keep | 49. paddle | 83. ticketing |
| 16. life | 50. puzzle | 84. virulence |
| 17. mass | 51. sample | 85. bafflement |
| 18. navy | 52. shield | 86. condescend |
| 19. raft | 53. spring | 87. disconcert |
| 20. some | 54. tubule | 88. illiterate |
| 21. that | 55. bicycle | 89. metropolis |
| 22. vice | 56. commode | 90. repression |
| 23. work | 57. discard | 91. animalcular |
| 24. aside | 58. excuser | 92. divestiture |
| 25. brawn | 59. gravity | 93. intrinsic |
| 26. chime | 60. leaping | 94. prerogative |
| 27. crown | 61. obloquy | 95. upholsterer |
| 28. equip | 62. pontiff | 96. interference |
| 29. flock | 63. retreat | 97. subantarctic |
| 30. grand | 64. society | 98. convocational |
| 31. hedge | 65. tigress | 99. imperturbation |
| 32. knock | 66. vitiate | 100. irresponsibility |
| 33. ought | 67. auditory | |
| 34. poppy | 68. churlish | |

The reasons for selecting the words on this particular basis were: (1) It would give a random sampling of the entire non-technical English vocabulary. Familiar or unfamiliar words, large or small words, hard or difficult words would all be included in the test lists in the same proportions in which they occur in the entire vocabulary. (2) This selection would give a list including a fair sampling of very easy and very difficult words, so that it could be used for testing the spelling capacity of the beginner as well as that of the expert speller. (3) It would yield a list sufficiently large for testing adequately any child's spelling ability. (4) It would give a list that could be duplicated in the same manner by anyone else, if, for some reason, it should be desired to have a different but comparable list. Similar lists of 100 words each could be constructed, for example, by selecting the 2d, 3d, or any other defined word on the even or odd-number pages of Webster's New International Dictionary and then discarding words in the manner described above so as to leave 600 words.

Several points concerning the validity of these tests must be discussed. First, it is urged by teachers that the lists do not contain a sufficient number of words familiar to the younger pupils to test fairly their spelling ability. To this we may reply that we are not trying to find out how many words any child can spell, but we are trying to test his spelling ability. We might likewise say that there are not sufficient familiar words for the older pupils either, because any pupil can spell a great many other words not found in these lists. The test is just, if only a fair sampling of words of the different types are present, so that the spelling ability of every pupil shall be measured accurately in relation to the spelling ability of every other pupil. There is good experimental evidence for believing that the tests do this.

Second, in testing any child or grade, how many lists need to be used, and how accurate is the resulting score? The experiments show that the spelling ability of any individual pupil can be ascertained quite accurately by the use of any two lists, preferably at two different times. Specifically, the problem would be this: If a pupil is tested with one list at one time and, let us say, the next day with a second list, how closely will

the two scores agree? On the basis of tests made with 519 pupils, the mean variation between the scores from any two of the six lists is 2.2 points. That is, the average deviation of the scores from two lists used on an individual pupil is 2.2 points. To illustrate the close agreement of the scores made by the same pupils on lists 1 and 5, for example, the following records are given:

RECORDS OF THE PUPILS IN THE FOURTH GRADE MADE WITH TWO LISTS.

List 1. Per cent.	List 5. Per cent.	Final score. Per cent.
65	61.....	63
57	53.....	55
73	74.....	73.5
52	52.....	52
46	47.....	46.5
59	58.....	58.5
64	63.....	63.5
62	61.....	62
47	50.....	48.5
54	49.....	51.5
57	56.....	56.5
51	44.....	47.5
63	56.....	59.5
51	46.....	48.5
Etc.		

Thus the first pupil spelled 65 per cent. of the words in list 1 correctly and 61 per cent. of the words in list 5 correctly, etc. The agreement is obviously close, and the average of the scores made by pupils in two lists will represent quite accurately his spelling ability.

To ascertain in a different way the reliability of the tests, a comparison was made between the efficiency in spelling as measured for each pupil by two lists and the marks assigned by the teachers to the pupils for the year's work in spelling. Coefficients of correlation were computed between the marks and the test scores for grades 3 to 8 in a school of 256 pupils. The following are the coefficients:⁷

Third grade.....	.80
Fourth grade.....	.69
Fifth grade.....	.73
Sixth Grade.....	.46
Seventh grade.....	.59
Eighth grade.....	.84
Average.....	.69

⁷These calculations were made by Mr. W. F. Roecker.

These coefficients are uniformly high, with the exception of the one for the sixth grade. The lower coefficient there is due to the inaccurate marking of the teacher, which is indicated by the fact that practically all her pupils were marked either "Good" or "Excellent." These high coefficients indicate a close agreement between the scores in the tests and the teachers' estimates of the pupils' attainments. There is every reason for believing that the tests give a far more accurate evaluation of a pupil's achievement in spelling than the teacher's mark, even at the end of a whole year of instruction and observation. Concrete evidence for this will be presented later.

Third, what is the relative difficulty of the six lists? Is a score made on one list comparable with that made on any other list? To answer this question all grades were tested on one day with list 1 and on the second day with one of the other five lists. In this manner a direct comparison could be made of lists 2 to 6 with list 1. These results showed that the lists are practically identical in difficulty, list 6 being slightly more difficult and list 5 slightly easier. The actual data are as follows:

List 2 is	.9 point	easier	than list 1.
List 3 is	.9 point	easier	than list 1.
List 4 is	2.6 points	easier	than list 1.
List 5 is	.9 point	harder	than list 1.
List 6 is	3.4 points	harder	than list 1.

For practical purposes the differences among the six lists, with the possible exception of lists 5 and 6, are so small that they are negligible. But if it is desired in any particular instance, the score of a given pupil or grade may be raised or lowered according to the above table of differences.

The fourth point relates to the relative difficulty of the words in each list. As they stand, the words are simply arranged according to size, which, of course, does not necessarily place them in the order of difficulty, except in a general way. The question of the relative difficulty of the words in each list separately is not very important so long as the lists as a whole are equal; that is, so long as each list contains approximately the same number of words of every degree of difficulty. This

is apparently the case, as shown above by the data given under the third point. For test purposes, the constitution of the various lists is practically identical.

Directions for Administering and Scoring the Tests. The tests are given in the following manner:

First have the pupils write the name, grade, school, city and date at the top of the sheet.

Pronounce the words clearly, but do not sound them phonetically, or inflect them so as to aid the pupils. Give the meaning of words that sound like words with a different meaning and spelling. The pupils are to write the words and to number them in the order in which they are given. Allow sufficient time for the writing.

Each grade is to be tested twice on two successive days. Use any one of the six lists on the first day and a different list on the second day. (When an entire school is being tested it may be desirable, though not necessary, to use on the first day the same list, say list 1, in all grades and any other list on the second day.)

In the first grade use the first 40 words of the list, in the second grade use the first 65 words, in the third grade use the first 80 words, in the fourth grade use the first 90 words, and in all other grades use the entire list.

The tests are scored by checking off all words spelled incorrectly and then counting the number of words spelled correctly. This number is the score and also the percentage of words correct, since the lists contain 100 words each. An average is taken of the scores made in the two tests, which is the final score for each pupil. Omitted words are counted as incorrect. Words that may be spelled in different ways are counted correct if they are spelled according to any one of the permissible ways.

Standards of Efficiency in Spelling. The spelling tests have been made thus far, according to the specifications stated above, on 2500 pupils in twelve schools of five cities located in Wisconsin, Minnesota and New York. From these tests tentative standard scores have been derived, which are shown in the following tables and curves. The standard scores are smoothed values derived from the actual averages. The differences between the two are very slight. These standard scores are probably not quite as reliable as those for reading and writing (see January and February numbers of this JOURNAL), because they are based on a smaller number of tests. This condition, however, is partly offset by the fact that the differences among the schools tested are less than those for

reading and writing, and by the fact that the smoothed values differ even less from the actual averages than was the case with the reading and writing scores.

STANDARD SCORES FOR SPELLING.

Grades	1	2	3	4	5	6	7	8
	10	30	40	51	61	71	78	85

The following table gives the results for the various schools tested:

Grades	1	2	3	4	5	6	7	8
City A, School 1.....	12.8	36.0	41.0	52.7	61.5	70.0	80.6	86.3
School 2.....	11.5	30.0	43.8	50.4	66.1	74.6	79.2	82.4
School 3.....	7.0	29.0	42.0	49.0	63.2	78.0	75.5	79.8
City B, School 1.....	....	....	....	....	65.5	79.2	85.0	90.0
City C, School 1.....	9.8	28.4	37.3	40.6	55.7	67.1	73.2	80.1
Averages.....	10.3	30.8	41.0	48.2	62.4	73.8	78.7	83.7

It is obvious that the attainment in spelling of a pupil, class, or school can be determined by means of these tests and standard curves.

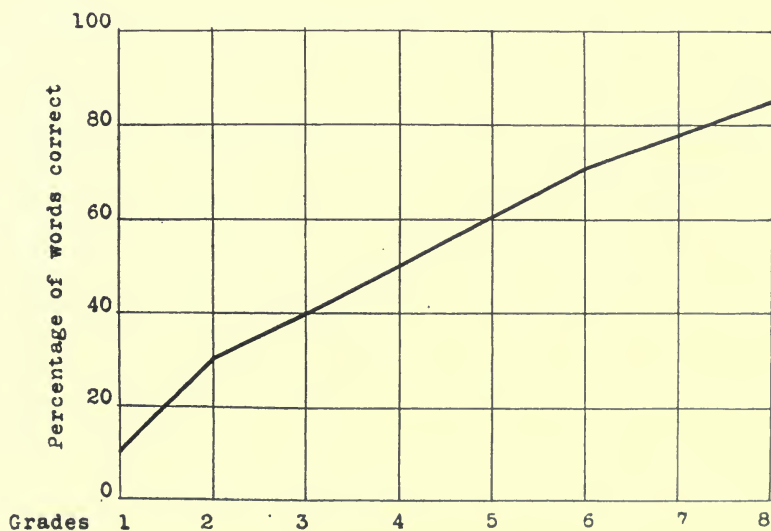


Figure 1. Standard curve for Spelling.

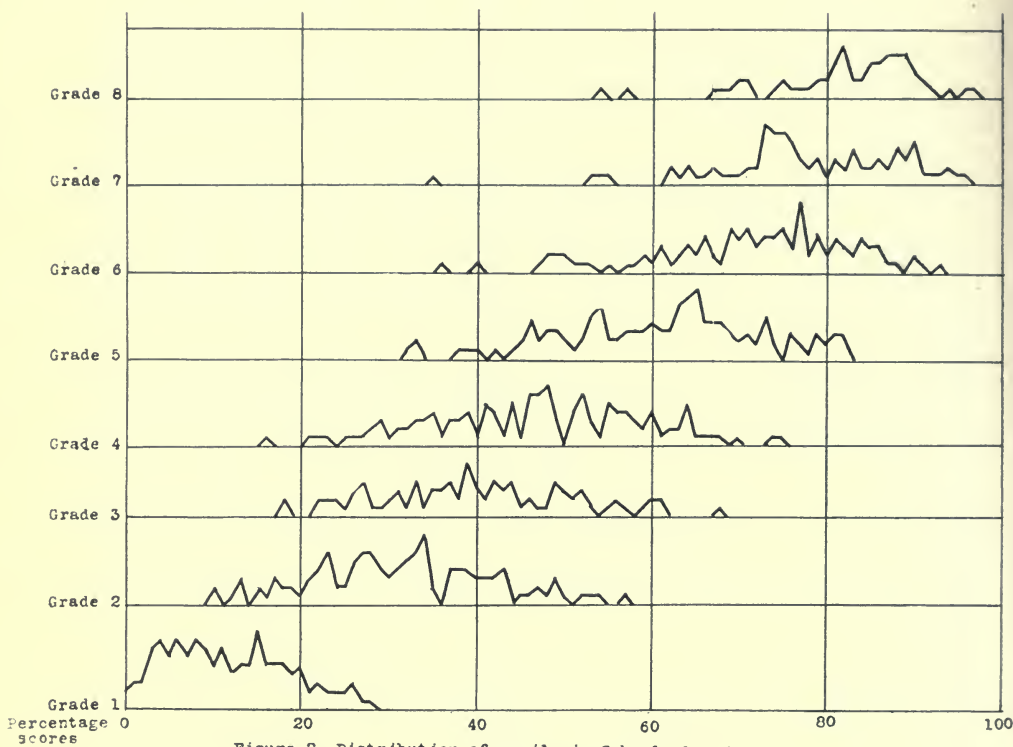


Figure 2. Distribution of pupils in Schools 1 and 2, City A and City B, in Spelling Ability.

Individual Differences and the Overlapping of Grades. The spelling tests reveal identically the same facts concerning the distribution of the pupils and the overlapping of the grades as were found in case of the reading and writing tests. The facts are presented in the curves of Figure 2. The numbers along the baseline are the percentage scores made in spelling, and the vertical distances indicate the number of pupils.

Little comment concerning the significance of these curves is necessary. The best impression of the real situation can be gotten by studying and comparing the curves themselves. To show the almost incredible amount of overlapping and the range of capacities found in the various grades, it will be seen that there are two pupils in the second grade who can spell as well as two pupils in the eighth grade. Other comparisons of a similar kind can be made on the basis of the curves. Expressing the amount of overlapping in terms of figures, we find that on the average 20.8 per cent. of the pupils in any given grade reach or exceed the median of the next grade above it, and 6.2 per cent. reach or exceed the median of the second grade above it.

THE OVERLAPPING OF GRADES IN READING, WRITING, AND SPELLING COMBINED.¹

We have noticed, in connection with each one of the three subjects examined, the astoundingly wide ranges of abilities manifested by pupils in the same grades. The question naturally arises, Would these differences not be very much less if each pupil's performance in all studies were measured and combined? Thus, a fourth grade pupil might write as well as the average seventh grade pupil and read as well as the average fifth grade pupil, but spell no better than the average first grade pupil. His average performance in all three studies combined would not deviate very much from the average of his grade.

Now, what are the actual facts with regard to this problem? In order to obtain information on this question, the three

¹These tests are printed in available form as a bulletin, *The Measurement of Efficiency in Reading, Writing, Spelling, and English*. The College Book Store, Madison, Wis.

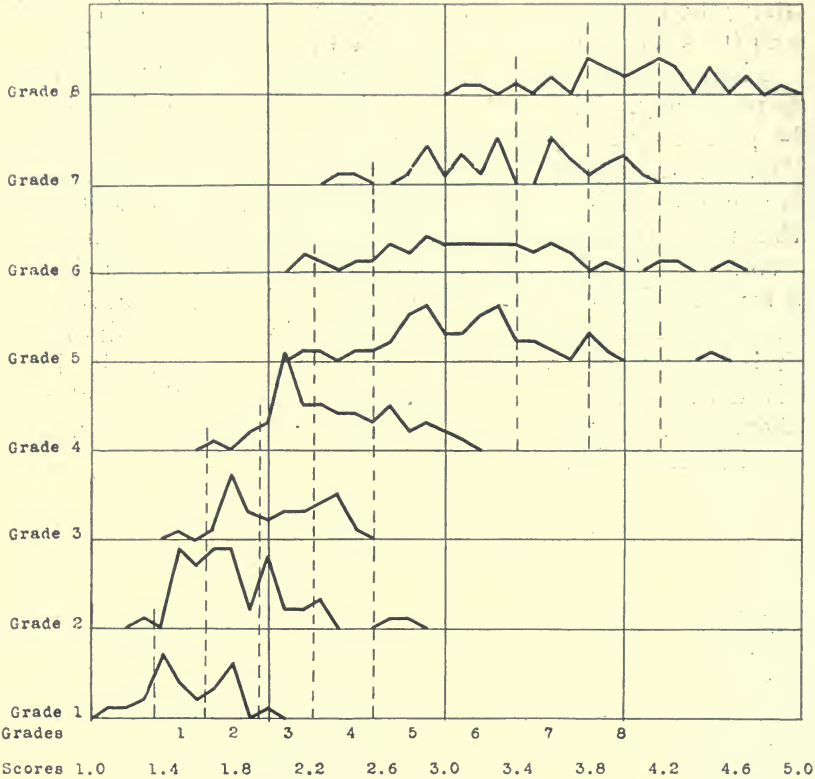


FIG. 3. Distribution of 401 pupils in Reading, Writing, and Spelling combined.

studies were taken to be of equal value, and an average score was computed for each pupil. This average score was obtained by reducing all scores for a given pupil to a common basis. For example, a fourth grade pupil made the following scores: Reading, speed, 2.6 words per second; comprehension, 13 words. Writing, speed, 81 letters per minute; quality, 9. Spelling, 44 words correct. The growth in speed of reading from the first to the eighth grade is from 1.5 words per second to 4.0 words per second, or a gain of 2.5. (See standard scores.) Similarly, the growth in comprehension is from 15 to 50 words, or a gain of 35 words; the growth in speed of writing is from 20 to 83 letters per minute, or a gain of 63 letters; the growth in quality is from 6.5 to 10.9, or a gain of 4.4 points; the growth in spelling is from 10 to 85, or a gain of 75.

If we may assume, as we have done here, that these increases are equal in value, then a growth of 2.5 in speed of reading = a growth of 35 in comprehension = a growth of 63 in speed of writing = a growth of 4.4 in quality of writing = a growth of 75 in spelling. Hence a gain of .1 in speed of reading = 1.4 in comprehension of reading = 2.5 in speed of writing = .22 in quality of writing = 3.0 in spelling. On this basis the final score of the pupil cited above is 2.4 in terms of the first member of the equation (speed of reading). In this manner a final score was computed for each pupil in a school of 401 pupils. These scores are plotted in the form of distribution curves for each grade, as shown in Figure 3.

A comparison of these curves reveals still an immense amount of overlapping. It is somewhat less than the overlapping of the performances in each subject separately, but it is not as much less as most teachers would anticipate. The vertical broken lines are so drawn as to indicate the range of ability that should be included in each grade. They are drawn at the points which lie half way between the standard scores of the various grades. For example, the standard score for the first grade is 1.5, and for the second 1.8. The vertical line is drawn at 1.65, and so on for the rest. Thus the space included between the first and the second vertical lines comprises the range that should be included in the first grade.

If we follow this column upward, we notice that it includes a considerable portion of the pupils in the second grade and a small portion of the pupils in the third grade. This means that these pupils in the second and third grade are only equivalent in performance to the first grade. If we make similar comparisons for the other grades, we find that the column for any one grade includes pupils in several higher and lower grades. Thus the column for the third grade includes pupils from the first up to the sixth grade, and the column for the fifth grade includes pupils from the second to the seventh grade.

If we express these overlappings in percentages, we find the following facts:

In the 1st grade	37.0%	reach or exceed the lower limit of the 2d grade.
In the 2d grade	31.4%	reach or exceed the lower limit of the 3d grade.
In the 3d grade	33.3%	reach or exceed the lower limit of the 4th grade.
In the 4th grade	27.4%	reach or exceed the lower limit of the 5th grade.
In the 5th grade	54.5%	reach or exceed the lower limit of the 6th grade.
In the 6th grade	30.0%	reach or exceed the lower limit of the 7th grade.
In the 7th grade	18.8%	reach or exceed the lower limit of the 8th grade.

Average . . . 33.2%

In the 2d grade	31.4%	fall below the upper limit of the 1st grade.
In the 3d grade	40.0%	fall below the upper limit of the 2d grade.
In the 4th grade	43.1%	fall below the upper limit of the 3d grade.
In the 5th grade	9.1%	fall below the upper limit of the 4th grade.
In the 6th grade	47.5%	fall below the upper limit of the 5th grade.
In the 7th grade	53.1%	fall below the upper limit of the 6th grade.
In the 8th grade	23.3%	fall below the upper limit of the 7th grade.

Average . . . 35.3%

This situation is utterly surprising. The highest one-third of the pupils in any given grade on the average are equal in efficiency to the pupils of the next grade above it, and the lowest one-third are equal in efficiency to the pupils of the next grade below it. This leaves only the middle one-third of pupils who are properly placed. In other words, if we were to place pupils according to their actual performance in school studies, one out of every three pupils should be in the next higher grade, one in the next lower grade, and one should remain where he is.

THE JOURNAL OF EDUCATIONAL PSYCHOLOGY

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EDITORIAL.

Is the relative amount of feeble-mindedness increasing? Many seem to think that it is. A striking characteristic of feeble-mindedness is the lack of those higher mental processes which make for intellectual and moral control. This lack of control, coupled with strong sex impulses, results in a higher rate of reproduction than is found with normal individuals, and, in spite of a high infant mortality, brings about a more rapid increase. Studies of school children indicate that as many as 2 per cent. of the school population must be classed as feeble-minded. Surveys of houses of detention, jails, reformatories and prisons substantiate the claim that feeble-mindedness is an important factor in the commission of criminal acts. The evidences of degeneration and defect accumulating on all sides have occasioned serious alarm in the minds of many reflective people lest the race become infected with this blight and gradually deteriorate in intellectual efficiency. It is chiefly this alarm that has led to the enactment of laws for the segregation or sterilization of the feeble-minded, and that has given weight to the eugenics propaganda.

It is interesting, therefore, to find a radically different view expressed in Dr. Goddard's recent book on *Feeble-mindedness*. Evidence is marshalled to show that feeble-mindedness is a unit character—a recessive trait, which appears with a fair degree of regularity in accordance with Mendel's principles of heredity. From this point of view feeble-mindedness is due to the absence of the determiner or group of determiners that give rise to "normal intelligence." It is probable that "normal intelligence" itself is an extremely variable and complex affair, involving all sorts of special aptitudes and abilities, each of which must be accounted for on the basis of heredity. This, however, does not militate against the essential point of the argument, which is that intelligence of any sort is due to a more or less complex group of determiners in the germ plasm, and that the condition known as feeble-mindedness is caused by the lack of these determiners.

Whether the view is well founded only further investigation can show; but if it be established, its significance for the attitude of society toward feeble-mindedness is worthy of consideration. If all the feeble-minded of the present day were eliminated or rendered powerless to reproduce, it would not free us from the problem, for the hybrid character of many apparently normal individuals would be revealed by the number of feeble-minded in the next generation. But even under present conditions it is probable that the number of feeble-minded is diminishing rather than increasing. The apparent increase is largely due to improved methods of finding and reporting cases. Doubtless there was a time in the history of the race when the highest human intelligence did not rise above that of the present moron. Feeble-mindedness is thus a vestigial phenomenon which is being gradually eliminated on account of the superiority of the dominant characteristic (intelligence) in securing adjustment to the environment. Undoubtedly the carrying out of the eugenics program would hasten the elimination, but our greatest present need is to recognize the essential nature of the feeble-minded, to give up the hope of trying to make him intelligent, to cease holding him responsible as intelligent, and to treat him as the arrested child that he really is. With such judicious treatment the high-grade feeble-minded might still become a useful, though inferior, member of society.

J. C. B.

NOTES AND NEWS.

Through the generosity of a resident of California, and in connection with the Panama-Pacific International Exposition, the National Education Association is able to offer a prize of one thousand dollars for the best essay on "The Essential Place of Religion in Education, with An Outline of a Plan for Introducing Religious Teaching Into the Public Schools." Religion is to be defined in a way not to run counter to the creeds of Protestant, Roman Catholic or Jew. Notice of intention to file an essay must be given the secretary of the Association by April 1, 1915. Essays will be limited to ten thousand words, and must be in the possession of the secretary by June 1, 1915.

A special committee of the New York City Board of Education has reported in favor of granting leaves of absence for two years to school teachers who are about to become mothers. Mrs. Bridget C. Peixotto, who was dismissed on the charge of neglect of duty on account of absence due to motherhood, and who appealed her case to the New York State Commissioner of Education, has been reinstated by the decision of the Commissioner, and has been allowed full pay for the time of her suspension. Sixteen other teacher-mothers who have been suspended on like charges will be more or less affected by this decision. This is a step in the removal of the obsession that dominates American school boards, that they must deprive the schools of valuable and experienced teachers because these women are fulfilling an obligation they have to themselves and to society.

The work in the training of teachers in the University of Washington has been reorganized and the School of Education changed into a College of Education. Prof. Frederick E. Bolton continues as dean of the new organization. Freshmen may now enter the College of Education instead of being required, as formerly, to complete two years of work in the College of Liberal Arts or the College of Science. The entrance requirements will be the same as for entrance to the College of Liberal Arts.

To secure the bachelor's degree the student must meet the following requirements: Zoology, 8 credits (semester hours); psychology,

4 credits; sociology, 6 credits; physical training, 8 credits; English, 0.8 credits; teaching subjects, 64 credits; total, 132 credits. The teaching subjects will include two academic majors, or one academic major and two or three academic minors. The major will consist of from 24 to 32 credits. The minor consists of from 12 to 16 credits. The teaching subjects will be elected by the student under the advice of the dean of the College of Education and the head of the department in which the academic major is chosen. The number of credits required in English is variable, depending upon the preparation of the student at entrance. The freshmen students are classified in English on the basis of their high school record and the progress which they make in the first semester.

It will be noticed that under this new plan the curriculum is much more flexible than usual. No specific requirements are made in foreign language, physical sciences, mathematics or history. It is not the intention to discriminate against these subjects. The student may freely elect if he chooses. It is assumed, however, that the student should have the important educational privilege of choosing largely his own courses. This is in harmony with the idea of the greater vocationalizing of education.

The foundation work in zoology and psychology will be given as far as possible with the teaching profession in mind. The department of zoology is planning to reorganize the first year's work in zoology so as to include some of the larger phases of the discussion of evolution, as well as the details of a usual beginning laboratory course in zoology. The subjects of zoology, psychology, sociology and education were selected with the idea of affording subjects which will give a knowledge of the child, a knowledge of society, a knowledge of the problems of education determined by the child and society, and a larger outlook upon the profession. Through the arrangement of academic majors and minors and by the greater freedom from specific requirements, it is believed that the student will have a better opportunity to select a wide range of subjects which he will teach and at the same time study intensively some one subject or group of subjects.

The attendance in the department of education has more than doubled during the last two years. At present there are about 400 different students, among them over 40 graduate students. Two additional instructors have been employed during the past two years,

making a total in the staff of five on full time, one on half time and one lecturer who gives one course each semester.

At the recent meeting of the American Psychological Association, held at Philadelphia, Pa., December 29-31, 1914, Prof. John B. Watson of the Johns Hopkins University was elected president for the ensuing year. As members of the Council for a period of three years, succeeding Professors Max Meyer and Margaret F. Washburn, Professors R. P. Angier of Yale University and W. D. Scott of Northwestern University were chosen.

The time and place for the twenty-fourth annual meeting was left to the decision of the Council. This decision has been reached, and the meeting will be held at the University of Chicago, December 28-30, 1915.

A special meeting for the reading of papers was also authorized to be held at San Francisco during the Panama-Pacific Exposition. This meeting will be in affiliation with the American Association for the Advancement of Science, within the week August 2-7, 1915. The organization and arrangements were placed in the hands of a committee consisting of Professor G. M. Stratton, University of California, chairman, and Professors Lillian J. Martin and Warner Brown.

The trustees of the North Carolina School for Feeble-Minded, at the annual meeting held in Kingston, recommended an extension of the institution including three buildings and involving an expenditure of \$120,000. Dr. C. B. McNairy was re-elected superintendent of the school.—*School and Society*.

Dr. A. Monroe Stowe, formerly professor of education in De Pauw University, has been elected president of Toledo University, the municipal university of Toledo, Ohio.

Mr. Thomas W. Churchill, president of the Board of Education of New York City, was recently re-elected to that position by a substantial majority. President Churchill has shown himself responsive to the demands of the community in educational matters and zealous to obtain the best possible educational opportunities for the children of New York City.

PUBLICATIONS RECEIVED.

(Notice in this section does not preclude a more extended review.)

BENJAMIN R. ANDREWS. *Education for the Home*. Bulletin No. 610. Washington: Bureau of Education, 1914. Pp. 53.

Contains an introductory survey of home economics in its relation to education, discusses the methods of teaching household arts, and outlines the equipment needed for teaching household arts in elementary, high, and normal schools. A final section deals with home economics in colleges.

ISAAC EMERY ASH. *Fatigue and Its Effects Upon Control*. Archives of Psychology, No. 31, June, 1914. Pp. 61. 60 cents.

Part one of this discussion deals with physical fatigue, presenting the locus of muscular fatigue, the conditions of fatigue, and original experiments in muscular fatigue produced by the use of the ergograph. Part two deals with mental fatigue, analyzing the problem, and detailing experiments on fatigue resulting from perception. The material used consisted of reading matter and four pages of reversible figures. There is an interesting section on the effects of practice in reversible perspective.

WILLIAM CHANDLER BAGBY. *Principles Justifying Common Elements in the High School Program*. Reprinted from School and Home Education, December, 1914. Pp. 12.

A masterly discussion of uniformity in the school curriculum on the ground that a high level of collective thinking depends upon a high level of common ideas. The author believes that the very essence of democracy is conditioned by the store of common ideas which determine the expressions of the electorate upon questions of public policy. Instead of the accidental and imitative uniformity of the past, we should strive for an intelligent and purposeful uniformity based upon those ideas and subjects which should be the common heritage of all.

WILLIAM CHANDLER BAGLEY. *School Discipline*. New York: The Macmillan Company, 1914. Pp. xiv, 259. \$1.25 net.

This book is intended for young teachers, and lays emphasis on positive and non-coercive rather than on restrictive or repressive methods of treatment. A picture of the well-disciplined school is followed by a like portrayal of the unruly school, in which both its general and specific causes are pointed out. The task of the disciplinarian—that of transforming the unruly school into the well-disciplined one—occupies the larger part of the work. There is a discussion of corporal punishment and the reasons for the reaction against it, an outline of temporary school penalties, an analysis of troublesome types, and a final chapter on discipline and the doctrine of interest. The book is written with the author's customary lucid style, and will make a strong appeal to those who are confronted by the actual problems of the classroom.

W. V. BINGHAM. *Five Years of Progress in Comparative Musical Science*. Reprinted from the *Psychological Bulletin*, Vol. XI, No. 11, November 15, 1914. Pp. 421-433.

A brief discussion of seventy-nine publications.

LOUISE DEKOVEN BOWEN. *Safeguards for City Youth at Work and at Play*. New York: The Macmillan Company, 1914. Pp. xv, 241. \$1.50 net.

"The following pages give a graphic description of the sordid and careless conditions under which thousands of young people habitually live, and of the valiant efforts of a small group of citizens to enlist popular agencies, state, county and city, to provide at least a minimum of protection. Although the observations and experiences here recorded are confined to Chicago, the book is perhaps chiefly valuable because of the unforgettable impression it makes upon the mind of the reader that the huge commercial cities of our day exhibit so little concern for the morale of the next generation." This passage from the preface by Jane Addams indicates the nature of the work. There are chapters dealing with civic protection in recreation, with legal protection in various walks of life, and with the need of further protection. It will undoubtedly become the basis for further discussion on the subject of means for the development of the race.

GARLAND A. BRICKER. *Agricultural Education for Teachers*. Cincinnati: American Book Co., 1914. Pp. 172.

This is a very simple introductory outline of the teaching of agriculture. It is written in response to the demand for a brief statement of the needs of the agricultural teacher, and of the points to be emphasized in preparation for this work. The widespread teaching of agriculture is such a recent movement in this country that communities in which agricultural high schools have been established find great difficulty in securing well-equipped teachers. While the perusal of this book will not in itself produce the well-equipped teacher, it will suggest to the thoughtful and open-minded teacher lines of further reading, which will be of decided help in teaching high school agriculture. There are chapters on qualifications of teachers of agriculture, the preparation of teachers, nature study, elementary agriculture, pedagogical problems, administration and teaching, the demonstration field, home projects, and agricultural clubs. A valuable feature is the abundance of references to periodical and other literature.

SHIRLEY JACKSON CASE. *The Evolution of Early Christianity. A Genetic Study of First Century Christianity in Its Relation to Its Religious Environment*. Chicago: The University of Chicago Press, 1914. Pp. ix, 385. \$2.25.

The author insists that the student of Christian origins must first orient himself in the life of the times if he would understand

the genesis of the new religion and the literature it produced, and the purpose of the present book is to furnish an outline for such orientation. The chapters include a discussion of the importance of environment for Christian origins, the early connections between Christians and Jews and the subsequent breach between them, the early Christian contact with the Gentiles' religion, the religious significance of emperor worship and of philosophical speculation, the Hellenistic religions of redemption, and the final triumph of Christianity. The book is a scholarly and open-minded discussion of an extremely interesting and important epoch in the history of the world's thought and belief.

The Psychological Researches of James McKeen Cattell. Archives of Psychology, No. 30, April, 1914. Pp. 101. \$1.00.

This monograph presents a review of Professor Cattell's studies on reaction time by V. A. C. Henmon; his studies of reading and perception by Walter F. Dearborn; his relation to the association method by F. Lyman Wells; his psycho-physical contributions by R. S. Woodworth; his studies by the method of relative position by H. L. Hollingworth, and his relation to the study of individual conditions by E. L. Thorndike. The monograph is a worthy monument to twenty-five years of untiring activity in the development of psychology in America.

IDA COE AND ALICE J. CHRISTIE. *Story Hour Readers' Manual. The Story Method.* Cincinnati: American Book Co., 1914. Pp. 320.

A series of graded lessons in story telling, games, and phonetics. The material is arranged in eighty steps. An appendix contains an elaborately illustrated guide to enunciation.

ELLWOOD P. CUBBERLEY. *State and County Educational Reorganization. The Revised Constitution and School Code of State of Osceola.* New York: The Macmillan Company, 1914. Pp. xx, 258. \$1.25 net.

In this volume the author states in concrete form certain fundamental principles relating to the administration of public education in the United States. The author promises for the immediate future a more formal discussion of principles of state and county school administration, in collaboration with Prof. Edward C. Elliott of the University of Wisconsin. Osceola is a hypothetical state somewhere in the upper Mississippi Valley, containing a few large manufacturing and commercial cities, a number of smaller cities, and large and important rural and agricultural interests. It is assumed that the state has become clearly conscious of the need and purpose of public education, and that it has made education an important state interest in its constitution, organized a strong state department of education, and replaced the district system of rural education by a county unit system. The constitution and code are drawn to secure

the elimination of party politics from the selection of expert educational officers, the concentration of authority with these experts, emphasis on the schools as community centers, provision for industrial and agricultural education, a definite scheme for the apportionment of funds, large local freedom, an adequate system for the supervision of teachers and supervisory officers, and a follow-up system which will tend to keep teachers professionally alive. The book is designed to stimulate discussion, and to act in some sense as a model for the educational provisions of a State constitution.

ELNORA WHITMAN CURTIS. *The Dramatic Instinct in Education*. Boston: Houghton-Mifflin Company, 1914. Pp. xvii, 246. \$1.00 net.

Anyone who has watched children at their play knows how strongly they tend to a dramatic representation of their ideas. How can this dramatic tendency be utilized in education? The author discusses the theater-going of children and points to many instances where the experiences of the theater have so stimulated and vivified interest in composition, history, and general affairs that they have had a marked effect upon school work. The author believes that there should be a constructive effort to provide children with good drama. They should not only be encouraged to go to see good plays, but they should be trained to appreciate these plays by dramatic work in the schoolroom itself. Other chapters discuss play, dancing, story-telling, puppet plays, and pageantry. There is a bibliography of fifteen pages, and a vigorous introduction by G. Stanley Hall.

HENRY S. CURTIS. *Education Through Play*. New York: The Macmillan Company, 1915. Pp. xix, 359. \$1.50 net.

This book is the best and most authoritative statement yet issued of the theory and present status of play in its relation to education. The author reserves the discussion of public recreation for a subsequent volume, and another volume on the proper conduct of play is promised at once. An introductory chapter on the various theories of play is followed by a discussion of the effect of play upon physical and mental training and upon character. Chapters 5 and 6 discuss play in German and English schools. Chapters 7 to 9, inclusive, consider play in relation to American school conditions, with special emphasis upon the system at Gary, Ind. The remaining chapters take up such topics as play in the curriculum, athletics, summer recreation grounds, playgrounds, school camps, and the training of play teachers. An appendix contains the rules for a representative number of games to be played by school children. It is a valuable practical contribution to the utilization of the play impulse in connection with school work.

FLETCHER B. DRESSLAR. *Rural Schoolhouses and Grounds*. Bulletin No. 585. Washington: Bureau of Education, 1914. Pp. 162.

This bulletin will be very useful for rural school authorities who

are planning the construction of new buildings. It is abundantly illustrated with floor plans and elevations, and there are forty-four plates, reproducing photographs of good school buildings.

HENRY R. EVANS. *Library Instruction in Universities, Colleges, and Normal Schools*. Bulletin No. 608. Washington: Bureau of Education, 1914. Pp. 38.

A brief account of the curricula of library instruction in the institutions of higher education in the different States.

H. W. FOGHT. *Danish Elementary Rural Schools, with Some Reference to Seminars for the Training of Rural Teachers*. Bulletin No. 598. Washington: Bureau of Education, 1914. Pp. 45.

The report deals with school organization and management, school architecture, preparation and tenure of teachers, salaries and pensions, and school maintenance. There are many photographs of rural schoolhouses.

WILLIAM BYRON FORBUSH. *Manual of Play*. Philadelphia: George W. Jacobs & Co., 1914. Pp. 353. \$1.50 net.

This is a practical and popular book intended chiefly for parents and the general public. The author discusses fittings of the home playroom, the home yard, the types of play in which children from one and a half to fifteen years of age engage. Play with dolls, laughter plays, plays of mimic life, impersonation, constructive play, outdoor play, Sunday play, and neighborhood plays are all considered. The book will be found especially useful to mothers who are desirous of finding something for their children to do.

JOSEPH M. GWINN. *Annual Report of the New Orleans Public Schools*, 1914. Pp. 249.

In addition to the report of the division of educational research on educational measurements, there are tables giving enrollment statistics by grades, distribution of pupils within grades, and the comparison of enrollment and attendance. There is an interesting report on a speed and accuracy test in arithmetic, another on the efficiency of kindergarten trained children, and one on oral hygiene.

CHARLES HARRIS. *A German Grammar*. Cincinnati: American Book Co., 1914. Pp. 352.

A well-arranged, clearly-written school text.

WILLIAM HEALY. *The Individual Delinquent. A Textbook of Diagnosis and Prognosis for All Concerned in Understanding Offenders*. Boston: Little, Brown & Co., 1915. Pp. xvii, 830. \$5.00.

In this massive volume the author gives an account of the purposes of the Juvenile Psychopathic Institute, and the history of the five years of its existence. Book One deals with general data, such as

the point of view from which the researches were undertaken, the limits of the field of study, the personality of the individual, the mental basis of delinquency, the methods of investigation, mental tests, statistics, and general conclusions. Book Two presents a detailed study of individual cases, types of delinquency, and causative factors. As in a medical textbook, the accounts of cases are brought forward as illustrative of points of view developed in the discussion. Such general topics are heredity, developmental factors, physical peculiarities, stimulants and narcotics, environmental factors, criminalism as a result of choice, mental imagery, habits, mental conflicts, epilepsy, mental defect, mental aberration, mental peculiarities, and cases of pathological stealing, arson, etc. In the discussion of mental tests there are excellent plates illustrating tests devised by Dr. Healy, and the text supplies directions for their use. While from the psychological point of view the work leaves much to be desired, the detailed description of over a hundred and seventy cases furnishes a mine of material for comparative studies. There is a bibliography of eighteen pages and a good index.

DAVID SPENCE HILL. *Measurements in Elementary Education*. An extract from the annual report of the Superintendent of Schools in New Orleans, September, 1914. Pp. 71.

This is the report of the division of educational research, and embraces studies of the progress of 36,284 school children in New Orleans, an account of the educational laboratory, and some considerations on industrial education. There are numerous tables and charts showing the number of over-aged children by schools, the progress of pupils in schools, and suggestions for the practical use of the data collected.

J. N. HUNT. *Modern Word Book for Primary Grades. An Elementary Course in Phonetics and Spelling*. Cincinnati: American Book Co., 1914. Pp. 80.

This is a new speller for the first and second grades. The lessons are grouped around an illustration which expresses action. The words are first given in column, and then arranged in story form. At the bottom of each page is a list of words for drill in phonetics.

GEORGE W. JACOBY. *Child Training as an Exact Science. A Treatise Based Upon the Principles of Modern Psychology, Normal and Abnormal*. New York: Funk & Wagnalls Co., 1914. Pp. xv, 384. \$1.50 net.

The author states that a treatise on child training as an exact science has seemed to him to be an urgent necessity. One may be permitted to doubt whether his idea of exact science corresponds with that of the physicist or the chemist. The discussion in this book is far from being either exact or scientific. It consists of a series of very general observations on the development of the nervous

system, the intellectual development of children, psychic abnormalities of childhood, and a casual discussion of the means that may be used in training parents and children to secure a complete all-round development. The book is written chiefly from the medical viewpoint, and represents the author's attempt to popularize what he considers important in paedological science.

CHARLES H. JUDD. *The Training of Teachers in England, Scotland, and Germany*. Bulletin No. 609. Washington: Bureau of Education, 1914. Pp. 84.

Although we already have a considerable number of works on the training of teachers in various European countries, this report of first-hand observation by one who has specialized in the training of teachers is of great interest and of decided value. It is noteworthy that a distinct effort is being made to bring the teachers of the *Volksschule* into contact with the universities. A striking feature in the preparation of teachers in all these countries is the rigid examination, or series of examinations, which candidates have to undergo before they are certified as prepared to teach.

JOSEPH KAHN AND JOSEPH J. KLEIN. *Principles and Methods in Commercial Education*. New York: The Macmillan Company, 1914. Pp. xiv, 439. \$1.40 net.

This is primarily a book for teachers and for the training of teachers in commercial education. It represents the results of extended experience in teaching and of serious reflection upon the principles involved. Part one deals with the value of business education, the course of study, and the general principles of method. In the discussion of method the authors do not progress far beyond the trite topics of self-activity, interest, perception, and proceeding from the concrete to the abstract. Part two develops methods in the special subjects of commercial education, as business arithmetic, bookkeeping, accounting, commercial geography, commercial law, history of commerce, economics, stenography, and typewriting. In part three the preparation and equipment of the commercial teacher are sketched, and the relation of the secondary school to the high school of commerce is pointed out.

OTTO KLEMM. *A History of Psychology*. Authorized translation from the German by Emil Carl Wilm and Rudolph Pintner. New York: Chas. Scribner's Sons, 1914. Pp. xiv, 380.

With the remarkable growth of psychology as a subject of experimental science and as a college discipline, there is manifest an increasing demand for a work that will open up for the student a perspective of the history of the subject. To fill this want is the purpose of the present volume. Part one deals with the general tendencies of psychology, describing the dualistic and monistic systems of psychology, the development of descriptive psychology, and the

transition to and growth of explanatory psychology. Part two deals with the development of the fundamental concepts of psychology, and discusses psychology as a science, the subject-matter of psychology—that is, consciousness—the classification of the contents of consciousness, psychological methods, and psychological measurements. Part three recounts the most important theories in the history of psychology, including theories of sensation, theories of space perception, theories of feeling, and theories of volition. The style is clear and lucid, and the work will be a valuable addition to the resources of the student of psychology.

WILLIAM A. MCKEEVER. *The Industrial Training of the Girl*. New York: The Macmillan Company, 1914. Pp. xi, 82. 50 cents net.

This is a condensation of the first part of the author's larger work on training the girl. While there is much good advice of the type that we are accustomed to hear in Sunday-schools, the continued moralizing becomes somewhat cloying to the taste. There is little evidence of any accurate or scientific analysis of the problems involved in the industrial training of the girl.

A. C. MONAHAN. *County-unit Organization for the Administration of Rural Schools*. Bulletin No. 618. Washington: Bureau of Education, 1914. Pp. 56.

There is an introductory discussion of the three types of organization now existing—the district unit, the township unit, and the county unit. The general outlines of county systems are sketched, and there is an account of the way in which the organization is effected and the results which accrue from it. Concluding sections compare consolidated with unconsolidated districts in Utah and Tennessee.

FRANCES M. MOREHOUSE. *The Discipline of the School*. New York: D. C. Heath & Co., 1914. Pp. xviii, 342.

In her discussion of discipline the author has endeavored to steer a middle course between the "soft pedagogy" which ignores social obligations and the blind severity which denies social advantages. "Discipline is inexorably sure of its authority, and sternly firm, but it recognizes the right of self-government which comes as the reward of trustworthiness, and the joy that comes from happy co-operation." The principal topics discussed are modes of school government, school discipline and American life, the disciplinary process, analysis of offenses common in American schools, punishment, and disciplinary devices. The book aims to be practical rather than profound, and contains many observations with which the experienced teacher will find himself in complete agreement.

HARRIET B. OSBORN. *Rural School Libraries at Small Cost*. Worcester, Mass.: State Board of Publication, 1914. Pp. 7.

Selected lists of books suitable for various grades. The sets can be purchased for five, ten, and twenty-five dollars.

RUDOLF PINTNER. *One Hundred Juvenile Delinquents Tested by the Binet Scale*. Reprinted from the *Pedagogical Seminary*, Vol. XXI, December, 1914. Pp. 523-531.

Of the one hundred boys and girls tested, the author finds thirty-three normal, twenty-one backward, and forty-six feeble-minded. The author concludes that the bad boy is not a clever boy; as a rule, he is decidedly stupid.

DANIEL STARCH. *Advertising: Its Principles, Practice, and Technique*. Chicago: Scott, Foresman & Co., 1914. Pp. 281.

This little volume is intended as a first textbook for students, and as an introductory handbook for business men. The treatment is, therefore, simple rather than technical, and there is a large number of illustrations and graphs to clarify and elucidate the text. There is an interesting discussion of the attention values of different types of advertising, the effect of contrast, the results yielded by different types of advertising mediums, the effect of repetition and follow-up methods, and tests of the strength of advertisements. The book contains a large number of interesting facts, and will prove suggestive to the advertiser who desires a somewhat scientific background for his efforts.

FREDERICK WILSON TRUSCOTT AND SIMEON CONANT SMITH. *Elementary German Composition*. Cincinnati: American Book Co., 1914. Pp. 150.

In part one there is a brief statement of the most important rules in German grammar, and the exercises for translation into German in part two are illustrative of these rules.

RAYMOND LOWREY WALKLEY. *Bibliography of the Relation of Secondary Schools to Higher Education*. Bulletin No. 606. Washington: Bureau of Education, 1914. Pp. 57.

An annotated bibliography, covering practically all the literature on the subject that has appeared during the last ten years.

JOHN W. WAYLAND. *How to Teach American History*. New York: The Macmillan Company, 1914. Pp. x, 349. \$1.10 net.

"This volume is intended for use as a textbook in normal schools, teachers' training schools, and teachers' institutes, and as a handbook for the teacher and student in school or at home. Special emphasis has been placed upon the moral values of history in normal social relations." Various chapters treat of the aims in the teaching of history, the time to begin history, history in the grades, the high school, the normal school, the uses of the story and of dramatics in teaching history, helps in teaching pupils to study, pupils' interests in history, the use of sources, and various devices to assist the teacher. The book is practical and suggestive, and should contribute much to increase the efficiency of history teaching.

THE JOURNAL OF EDUCATIONAL PSYCHOLOGY

THE BINET SCALE AND THE DEAF CHILD.

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An attempt was made by the writers to see how far the Binet-Simon Scale could be applied to test the mentality of the deaf child. The purpose was not primarily a practical one. We did not test the children with a view to diagnosing such feeble-mindedness as might exist among them. Our aim was purely theoretical, in as much as we wished to determine to what extent the present Binet-Simon Scale (Goddard's revision) might be used with the deaf child; to what extent it might be used for practical purposes hereafter.

No published account of any such work has so far come within the writers' notice. The inadequacy of the scale is felt by Healy,¹ when he says: "It (the Binet Scale) helps very little where the language factor is a barrier, either on account of foreign parentage or insufficient schooling, and with uneducated deaf and dumb children." The scale is also referred to in an article in the *Volta Review*,² in which the Binet Scale as printed by Huey³ is there reprinted with a few introductory remarks. The writer says: "While the following

¹HEALY AND FERNALD. *Tests for Practical Mental Classification*. Psych. Rev. Mono., Vol. 13, No. 2.

²*Binet's Scale for Measuring Intelligence*. *Volta Review*, Vol. 13, No. 1, April, 1911, p. 26.

³J. of Ed. Psych., October, 1910.

tests for feeble-mindedness were worked out for hearing children, they may readily be adapted for application to the deaf; or, at any rate, may serve to indicate the principles upon which a similar scale for such specialized cases might be based." The present paper will show that the scale as it stands cannot so readily be applied to the deaf.

The tests were given to a miscellaneous group of pupils at the Ohio State School for the Deaf.⁴ In all, twenty-two pupils were tested, but the results obtained from a few of them were so meager as to be of little account.

We first made an attempt to apply the tests in written language only. For this purpose all the questions were typewritten on separate slips of paper, and these were presented to the child in order. The child then gave the answer in writing. For the memory tests the numbers were exposed one at a time, allowing sufficient time for the child to read them, and then he wrote what he remembered. A strict carrying out of this procedure was soon abandoned, since it was found that very often the child did not understand the written question, whereas he did understand the same question if he were asked by means of the manual alphabet and sign language. Fortunately, one of the writers, Mr. Paterson, was sufficiently well versed in these methods of communication to be able to reach the children. The ultimate method, then, of giving the tests was a mixed one. The manual alphabet and sign language, oral methods as far as possible with orally-taught pupils, and writing wherever this was feasible were all used at the discretion of the tester. Our main object was to see how many of the tests could be applied and to give the pupils as good a chance as possible. Such a mixed method of applying the tests would not, of course, be the ultimate ideal way. If these tests are to be used for diagnostic purposes, the method of giving them must be standardized and rigidly adhered to.

Numerous difficulties were encountered in giving the tests, and these may be well summarized under three headings—(1) Lack of comprehension, (2) Lack of environmental experience, (3) Difficulties due to the peculiar psychology of the deaf.

⁴The writers wish to acknowledge the kindness and courtesy shown to them by Mr. Jones, the superintendent; Mr. Patterson, the principal of the school, and all of the teachers.

Lack of Comprehension. The first difficulty encountered here was unexpected. We found that many of the children, and particularly the younger ones, did not seem to understand what a question was. They simply did not understand that we were asking questions. They evidently thought that we were telling them something more or less interesting, and something that certainly did not require an answer. And so they would remain gazing at the examiner or the written question. This is very much like the attitude of a feeble-minded child, but in many cases we believe that the child was not feeble-minded, and in others we know that the child understood the subject-matter of the question, but did not understand that it was a question. Again, in some cases the child would merely repeat the question or part of the question, and this again in cases where we think feeble-mindedness was not the cause. The child seemed merely not to know that we were asking a question or that an answer was required. Some of the difficulty we encountered here may be due to the usual class-room attitude of the child. A large part of the instruction requires the child to repeat again and again what the teacher has said. The responses that he is called upon to make are very largely imitative, particularly in the lower grades.

The meagerness of a deaf child's vocabulary was another factor that raised difficulties in getting the child to comprehend the questions. The knowledge of how much can be demanded in this respect of the deaf child at each successive age would naturally go a long way to solve our problem. We know that comprehension of our language is one of the greatest difficulties that the deaf child has to overcome, but what we do not yet know is precisely how much language we can expect of the normal deaf child at the various stages of his mental growth. A great many children did not seem to comprehend such a question as "What is the difference between a butterfly and a fly?" And yet they knew that a butterfly was larger than a fly, and that these two insects were not the same.

Lack of Environmental Experience. Under this heading come a few of the tests that obviously depend upon the environment of the child. The normal child will generally have

opportunity to handle stamps, but to many children in an institution this opportunity may not come very often, and they may remain for a long period in total ignorance of the value of a red two-cent and a green one-cent stamp. And so also in regard to money, but this to a much lesser extent. This same difficulty is encountered with other than deaf children, *e. g.*, children in children's homes, Gipsy children, etc.

The Peculiar Psychology of the Deaf. By this is meant the peculiar manner in which many of them express their ideas. Binet⁵ himself speaks of the "peculiar mentality of deaf-mutes," and of having asked a deaf adult this question, "You were alone?" To which he received this answer, "Yes, I am alone, and I have two deaf-mute comrades." Let us give a few examples from the replies to some of the questions in our tests.

Q. What would you do if you broke something that did not belong to you? A. If I broke something that did not belong to me, perhaps Mr. J. would be mad with me. Q. What would you do if you were going somewhere and you missed the train? A. Baltimore and Ohio. A. I would be sad if I missed the train and I would go again. A. Go home, get candy. Q. What would you do if you were on your way to school and suddenly found out that you were going to be late? A. I would have no time to drink water. Q. What would you do if you were struck by a playmate who did not do it on purpose? A. I did not hit it. Neighbor's Visitors (Age XII) elicited the response: My neighbors would be surprised at a doctor, a lawyer and a preacher.

Some of this is no doubt due to the difficulty that the deaf have in expressing themselves in idiomatic English, but we do not believe that all of it can be explained by that alone. They also find it difficult to understand idiomatic English, and there would seem to arise a confusion of thought due to this partial comprehension, and made more confusing by their difficulties in expression.

In addition to these three main points, we noticed that most of the children tested were constantly on the lookout for any

⁵BINET ET SIMON. *Peut-on enseigner la parole aux sourds-muets?* L'Année Psychologique, p. 373, Vol. 15, 1909. English translation in American Annals of the Deaf, pp. 4-33, Vol. 55, No. 1, January, 1910.

suggestion that the examiner might unconsciously give in order to help in answering the questions. In this respect they resemble feeble-minded children, although we do not thereby imply that this openness to suggestion is by any means a proof of feeble-mindedness. It is rather a result of the position in which the deaf are placed with respect to their hearing fellows. They must be constantly on the lookout for clues in regard to what is being said round about them, and in regard to the manner in which they are expected to respond.

THE TESTS.

In Table I are given the results for the individual tests; in the first column, the number of the test in Goddard's Revised Scale; in the second column, the number of children tested; in the third, the number of right answers; in the fourth, the number of wrong answers, and in the fifth, the number of cases in which we believe inability to answer was based upon inability to comprehend the question.

It seems probable that all questions in age III can be answered after the child has been at least one year in school. In age IV most of the questions are answered correctly, and those not so answered probably show real ignorance. In age V all questions can be readily applied. The 50 per cent. failure in question 5 did not arise from a misunderstanding as to what was wanted. In age VI questions 1, 2 and 3 are difficult to apply. We feel that we succeeded in questions 1 and 3, but in regard to question 2, the language difficulty was too great, and so we have registered all the failures as being due to non-comprehension, although some of these are undoubtedly due to ignorance. In question 4 (show right hand, left ear) it is surprising that ten out of eleven fail. These ten either did not know which was right and left, or had left and right completely reversed. All of the tests in age VII can be given. Questions 1, 4 and 5 were answered with little difficulty. The failures in questions 2 and 3 did not seem to be due to inability to comprehend the question. In age VIII the first question is again one of language, and failure to comprehend is evident. The high percentage of failures in questions 4 and 5 are not due to this. They were evidently too hard for the pupils

Test.	TABLE I.			
III:	No. tested.	Right.	Wrong.	Not com- prehended.
1.....	1	0	0	0
2.....	0	0	0	0
3.....	5	3	2	0
4.....	15	13	2	0
IV:				
1.....	8	4	4	0
2.....	8	6	2	0
3.....	10	9	1	0
4.....	7	6	1	0
V:				
1.....	8	6	2	0
2.....	11	10	1	0
3.....	6	4	2	0
4.....	12	9	3	0
5.....	8	4	4	0
VI:				
1.....	8	6	2	0
2.....	16	5	0	11
3.....	5	3	2	0
4.....	11	1	10	0
5.....	13	9	4	0
VII:				
1.....	19	15	4	0
2.....	18	10	8	0
3.....	17	9	8	0
4.....	18	12	6	0
5.....	20	19	1	0
VIII:				
1.....	15	5	2	8
2.....	18	11	7	0
3.....	17	15	2	0
4.....	18	7	11	0
5.....	17	7	10	0
IX:				
1.....	16	2	14	0
2.....	16	4	1	11
3.....	17	11	6	0
4.....	18	12	6	0
5.....	16	5	11	0
X:				
1.....	16	12	4	0
2.....	13	4	9	0
3.....	13	2	11	0
4.....	6	0	2	4
5.....	12	4	8	0
XI:				
1.....	3	0	2	1
2.....	9	0	9	0
3.....	14	7	7	0
4.....	6	1	5	0
5.....	9	0	9	0
XII:				
1.....	6	1	5	0
2.....	7	0	7	0
3.....	3	0	3	0
4.....	5	1	4	0
5.....	4	0	4	0
XV:				
1.....	2	0	2	0
2.....	1	0	1	0
4.....	2	0	2	0

tested. In age IX, question 2, the definitions present the same language difficulty. Question 1 is evidently beyond the arithmetical ability of the children tested. Question 5 seems to show a real defect in the sensitivity for lifted weights. In age X we have again the language difficulty in question 4. In age XI we see the same difficulty with question 1, and that is the reason why it was attempted with so few of the children. We felt it was perfectly hopeless to attempt it again with the others. Question 2 seems to be too difficult. Question 3 was given in written form, and Pyle's⁶ norm for eleven-year-olds was used as a criterion. Little can be said concerning ages XII and XV. Questions 2 and 5 in XII bring up the language difficulty. The other questions seem possible of application.

The survey of the results has led us to believe that the following tests ought to be dropped from the scale if it is to be adapted for diagnostic purposes for deaf children: VI, 2; VIII, 1; IX, 2; X, 4; XI, 1; XII, 2, 5. Again it would seem that the deaf are not on an equality with the hearing as indicated by the high percentages of failures in many of the tests. The following tests appear to us to be too difficult for the deaf child for the age in which they are placed: V, 5; VI, 4; VII, 2, 3, 4; VIII, 2, 4, 5; IX, 1, 3, 4, 5; X, 2, 3, 5; XI, 2, 3, 4, 5, and all in XII. It would seem that the scale as a whole is too high for the deaf child.

We are led to the same conclusion from a study of Table II, in which the results for each individual child are given. The first column gives the number of the child; the second, the chronological age; the third, the mental age, and the fourth, the number of years retarded.

None of the children, with the exception of No. 11, tested up to their age, and No. 11 was a boy who possessed quite a considerable amount of hearing. He could hear without any difficulty when spoken to slowly and distinctly in a quiet room. The mental age was computed by giving fractional credit in accordance with the number of questions which were given, and which we believed the child comprehended. Counting

⁶W. H. PYLE. *The Examination of School Children*. New York: Macmillan, 1913.

TABLE II.

Record No.	Chron. age.	Mental age.	No. of years retarded.
1.....	Insufficient data.		
2.....	16	10.0	6.0
3.....	12	8.1	3.9
4.....	14	9.1	4.9
5.....	12	9.0	3.0
6.....	10	8.7	1.3
7.....	16	6.4	9.6
8.....	9	6.1	2.9
9.....	8	6.03	2.0
10.....	11	9.5	1.5
11.....	9	9.0	0.0
12.....	9	8.33	0.7
13.....	9	5.81	3.2
14.....	14	9.4	4.6
15.....	9	7.8	1.2
16.....	16	7.1	8.9
17.....	20	7.65	12.4
18.....	12	9.74	2.3
19.....	Insufficient data.		
20.....	19	4.99	14.1
21.....	Insufficient data.		
22.....	Insufficient data.		
n = 18. Average.....	12.5	7.9	4.58

1.00 as full credit for all questions in one age answered correctly, then one out of five was credited .20, one out of four .25, one out of three .33, and one out of two .50. This method is, of course, open to criticism when only two or three questions in an age can be asked. It obviously gives a very high credit for a right answer under these circumstances. It seemed, however, to be the only method open to us if we wanted to arrive at an approximate mental age, however inaccurate this latter might be, and since we are not here primarily concerned with diagnosing feeble-mindedness, it allows us to arrive at the amount of retardation in each case.

Of the twenty-two records, eighteen were full enough to be of value. The average chronological age of these eighteen children is 12.5; the average mental age, computed as we have explained, is 7.9, and the average amount of retardation is 4.5 years. Obviously this does not mean that the normal deaf child is four and one-half years retarded as tested by the scale, but it does seem to suggest the question whether perhaps the normal deaf child is not on the whole more backward than the hearing child of the same age. To arrive at some answer to this question we may eliminate some of the obviously feeble-minded from the table. No. 17 is clearly defective. He is twenty years old, and has been in the institution for twelve years and only reached the fourth grade. Similarly with No. 20, a boy nineteen years old, who has been in the institution twelve years and only reached the third grade. We may also eliminate No. 11, who has too much hearing to be classed as a deaf child. No. 7, who shows nine years retardation, is a girl of sixteen years, who has been in the institution two years and arrived at the second grade. She does not appear to us to be feeble-minded, and we would not, therefore, eliminate this record. No. 16, however, who shows less retardation, *i. e.*, 8.9 years, seems decidedly feeble-minded, having a shiftless gait and bad muscular co-ordination. She has been in the school six years and has only reached the third grade. If, then, we eliminate these four cases—Nos. 11, 16, 17, 20—and then add up as usual, we find that the average amount of retardation for the fourteen cases that remain is 3.4 years. We venture to suggest that it is very possible that the normal

deaf child is during his school life about three years retarded as contrasted with the normal hearing child. For diagnostic purposes the scale should, therefore, be shifted three years forward. If we do this, we find that eight of the children would be considered normal, as they undoubtedly are. Three, Nos. 3, 4, 14, would be considered backward, and the rest probably feeble-minded.

In summing up we conclude that the Binet-Simon Scale as it now stands cannot be applied satisfactorily to deaf children. The whole scale must, in the first place, be shifted three years forward, *i. e.*, age III on the present scale would have to be called age VI on the deaf scale, and so on. Further, there are a few tests which it would be advisable to eliminate from the scale entirely. These have been listed above in the text. Tests to replace these, standardized on hearing and on deaf children, are required. The writers suggest that the best type of test, suited to fill these vacancies, would be performance tests. A considerable amount of data was gathered by the writers with four form boards—Knox's Imbecile Board, Knox's Casuist Board, Knox's Feature Profile Board⁷ and the Vineland Adaptation Board.⁸ It was felt, however, that most of these form boards have, up to the present time, been so inadequately standardized that no useful interpretation of our results with the deaf could be given. We do feel, however, that this type of test is the one that is needed to complete a Binet Scale for the deaf. That such would be useful there is no doubt, in view of the thousands of deaf children in this and in other countries. The writers have merely attempted to point out the inadequacies of the present scale. The construction of an adapted scale for the deaf has still to be accomplished.

⁷For a description of these three form boards see KNOX, *A Scale Based on the Work at Ellis Island for Estimating Mental Defect*. J. of the Amer. Med. Assoc., March 7, 1914; also, KNOX, *Tests for Mental Defectives*. The J. of Heredity, March, 1914.

⁸H. H. GODDARD. *The Adaptation Board*. Psychological Bulletin, Vol. 9, 1912, p. 79, and H. H. GODDARD, *The Adaptation Board as a Measure of Intelligence*. The Training School Bulletin, Vol. 11, No. 10, Feb., 1915, p. 182.

RELIABILITY OF ESTIMATES OF GENERAL INTELLIGENCE, WITH APPLICATIONS TO APPOINTMENTS TO POSITIONS.

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One often hears an employer speak somewhat as follows: "I don't care so much about an applicant's special training, so long as he has a certain minimum of knowledge and training understood to be necessary to do the kind of work in question. What I want to know is, 'How good a man is he?'" What the employer assumes is that there is something which may be called general intelligence or general ability, which more or less assures potentiality for efficiency. What he wants to know is the applicant's relative status with regard to this ill-defined something we call general intelligence.

This attitude is characteristic not only of employers in the commercial and industrial fields, but in fields of employment generally. It is characteristic, *e. g.*, of the attitude of educators desiring to fill important positions in colleges and universities. In the latter instance, to be sure, records of objective tests of scholarship in the way of written examinations are available and indispensable, but these test acquisition primarily and ability only secondarily; in addition, the question "How good a man is he?" is practically sure to be asked, and if asked, more or less roughly answered. It is usually answered in the proverbial testimonial with which we are all familiar, but which few of us know how to evaluate, unless we know the man who wrote it. Doubtless, any facts which would tend to make such certificates less flowery and more interpretable by reference to known standards of measurement would be acceptable. In the present paper the author hopes to make some suggestions for working out a scheme to enable us to make our statements increasingly more definite in this particular.

Table I gives the ranks of the subjects as rated by the different judges. The blank spaces in eight instances are due to the fact that the judge himself formed one of the group of subjects, and consequently omitted his own name in the rankings. In the remaining three instances the name was omitted because the judge felt that he did not know the subject sufficiently well to be able to rate him.

We may assume that the truest judgment concerning the mental status of an individual is that expressed by the average of the opinions of the most competent judges obtainable. The combined or true rating for each individual, in the present instance, is indicated in Table II. The order of merit and

TABLE II.

True Ranks of Subjects, and Distances Between Them, in Terms of Deviation from Median.

No. of Subject.	Deviations from the Median Rank of All.
12	+6.5
11	+2.94
2	+2.64
6	+2.0
4	+1.36
1	+ .45
5	— .46
10	—1.1
8	—1.74
3	—2.27
7	—4.09
9	—5.91

the distance between each two persons was obtained from Table I by the methods made familiar through the work of Cattell, Thorndike and others.¹ Hence the accuracy of the estimate of each judge in ranking the different subjects may be expressed in terms of a Pearson coefficient of correlation between this "true" judgment and the judgment of each. In a similar way the accuracy of the estimates given by the mental tests may be stated. These Pearson coefficients of correlation are given in Table III.

¹For details see the author's *Correlation of Mental Abilities*, pp. 72-74, published by Teachers College, New York, 1912.

TABLE III.

Pearson Coefficients of Correlation Showing the Relative Reliability of the Estimate of Each Judge, and That of the Mental Tests, Given Four Years Previously.

	Correlation with True Estimate.
Estimate of 'general intelligence' of subjects by Prof. A. ....	.97
Estimate of 'general intelligence' of subjects by Prof. B. ....	.94
Estimate of 'general intelligence' of subjects by Prof. C. ....	.94
Estimate of 'general intelligence' of subjects by Prof. D. ....	.73
Estimate of 'general intelligence' of subjects by Student A1. ....	.92
Estimate of 'general intelligence' of subjects by Student A2. ....	.92
Estimate of 'general intelligence' of subjects by Student B. ....	.89
Estimate of 'general intelligence' of subjects by Student C. ....	.87
Estimate of 'general intelligence' of subjects by Student D. ....	.84
Estimate of 'general intelligence' of subjects by Student E. ....	.82
Estimate of 'general intelligence' of subjects by Student F. ....	.81
Estimate of 'general intelligence' of subjects by Student G. ....	.74
Estimate of 'general intelligence' of subjects by Student H. ....	.65
Estimate of 'general intelligence' of subjects by 3 combined tests. ....	.84
Estimate of 'general intelligence' of subjects by 5 combined tests. ....	.82
	Av.=.90
	Av.=.83
	Av.=.83

The following points are worthy of note:

(1) the most accurate ratings are those given by three of the professors, and these agree closely among themselves. The rankings of the remaining member of the faculty—Professor D—are next to the most inaccurate of all. The relatively inaccurate rankings of Professor D are doubtless largely due to the fact that the subjects were not as well known to him as to the other professors. However, it is important that so marked a divergence as this from the judgment of others should be known and taken into account in recommending the persons here under consideration for positions.

(2) As to the rankings by students, the general fact is that they are appreciably less accurate than those given by the professors. There is considerable variation in their accuracy, ranging from a coefficient of .92 to one of .65, with an average of .83. Again it is apparent to the writer that one important factor making for inaccuracy in ratings is the fact that not all of the persons rated are equally well known to the judge.

(3) The accuracy of the mental tests used as a means of

measuring the relative intelligence of the subjects is practically the same as that of the judgment of the average of the student-judges, .83. Of the ratings by persons, 61 per cent. were more accurate than those by the tests. The average correlation for all judgments by persons was .85, as compared with .83 for the mental tests.

In this connection it must be remembered that the tests were arranged and administered in 1907. Had they been selected and administered as late as 1912, the results given by them would have been considerably more accurate. Also, if the judgments by persons had been given in 1907, when the tests were given, instead of in 1911, they probably would have been considerably different, as some of the subjects had meanwhile attained a degree of prominence that must have modified the judgments.

If it could be shown that a series of tests could be given now that would give us as accurate an estimate of the general mental ability of graduate students as the average judgment of the professors, it would be a fact of a great deal of importance. In view of work done in the last three years, this seems not improbable, provided sufficient care, time and psychological insight are used by the experimenter. Mechanical and superficial administration of mental tests has already done sufficient damage in this important domain of psychology, even in cases where the writers have believed themselves to be putting down a perfectly reliable P.E., as the writer hopes soon to emphasize from available data.

APPLICATION TO APPOINTMENT TO POSITIONS.

Selecting a man for a college position at \$2000 a year to teach history of education and psychology presents little difficulty up to a certain point. The number of competent persons available at any given time and place is not likely to be large. In the selection two questions arise: (1) Of the persons available in any one university, which candidate is the best? (2) Just how good a man is he?

The first question, usually, is easily answered. However, reference to the ratings of subject number 10 by the four professors, as shown in Table I, would show that a prospective employer might be considerably confused as to the mental

status of this subject if he first consulted Professor D or his recommendation and then Professors A, B and C or their recommendations. Practically no doubt what is brought to bear upon the prospective employer is a somewhat roughly combined judgment of a number of professors and instructors as presented through an appointment secretary. In that case it remains merely to have the data in a form which is definite, accurate and easily interpretable.

The second question—just *how good* a man is candidate A—is not so easily answered. This is where the interpretation of the testimonial comes in. The following suggestions are thrown out in the hope of outlining and stimulating the working out of more scientific methods of meeting this and similar problems:

The obvious data to be used in an attempt to rate graduating students on an objective scale would be a table something like Table I, obtained by having the students confidentially rated in order of merit for general mental ability by the professors and instructors well acquainted with them. Table II is, so far as it goes, such a scale, constructed on approved principles from the data of Table I. What is needed is to extend the application of the principle so as to make it include a larger number of students whom it may be desirable to rate for any one year, and secondly to make the scale cumulative. By this I mean to have the outgoing class of 1908 in one column, as in Table II, the class of 1909 in a second column beside it, and so distributed that the status of each person in the 1909 column is accurately indicated by a point on the scale in relation to the position of the members of the 1908 class. Each year adds a new column to this cumulative scale, so that at the end of ten years the appointment secretary is able to state definitely to an official seeking the best available man for a position, that Mr. A is rated on the official scale as +2.1. Looking across the line horizontally one sees the names of those who in the last ten years were rated about equally with him. Some of these will often be known by the inquiring official personally or through their works. In this case we have a statement that is definite and in terms of the known.

What difficulties there are in the practical working out of such a scheme appear in properly treating the data given in

the original table of ranks and in getting this data from the professors and instructors. In most cases in our large universities not all of the students whom it is desirable to rate are known by a sufficiently large number of professors. For instance, toward the close of the academic year the appointment secretary sends out to each instructor and professor a list of all the students to be rated on the scale, with these instructions: "Select from the enclosed list those students concerning whose abilities you are well acquainted. Arrange them in order of merit with respect to general intelligence and mental ability, putting down as No. 1 the person most able, No. 2 the person next most able, etc." What the appointment secretary gets in reply to his request depends upon conditions at the university and in the department where the request is made. Some students may be well known to only four or five professors, and accordingly be rated by only so many. Probably no professor would include more than twenty on his list, as most judges find that they cannot with satisfaction to themselves rate a larger number than this in order of merit where range of differences in ability is no greater than among advanced graduate students of a university. Thus there would be adequate data for rating some in relation to the other students present for the year and inadequate data for accurately rating others.

Let us look at the situation and see what is to be done with the data. The methods would, of course, vary more or less with the conditions in any particular institution and with the needs. The writer has in mind needs and conditions in a certain graduate department of a large university. This department is probably fairly typical in the respects now under consideration. Here it is of prime importance to rate in this way only those who are highest in attainments, capable of filling positions of leadership and progressive scholarship, and ready for appointment at the close of the year. The most of them are Ph.D. candidates who have been in residence from one to three years.

On the whole, the most advanced and capable of them are well known to from five to ten members of the faculty by the time they are ready for graduation and appointment. Con-

sequently they are rated by a sufficient number of professors to enable the appointment secretary to assign them a fairly accurate place on the scale for that year.

The second problem consists in making the scale cumulative in the sense explained above. In order to do this it would be necessary for the appointment secretary to send out to each instructor or professor a second list of names to be similarly rated in order of merit. The second list would contain the names of the first list, and in addition the names of seven or nine of the well-known names on the scale of the previous year, preferably one name from about the median ability, one from each of the extremes of ability, and the others from intermediate points along the scale. This addition to the list of names would probably make it necessary for each professor doing the rating to drop some of the names previously rated. Nevertheless, with the two sets of ratings the appointment secretary would have the necessary data for constructing a usable and useful cumulative scale. The position of each person in the 1909 column of the cumulative scale is determined in relation to his position with reference to those in the list for 1908 rated with him. The principle involved is essentially that used in constructing Table II. To be sure, in this form the method might not in all respects suit the requirements of the critical mathematical theorist, but for the present we are more concerned with practical improvements in methods now used than with pleasing the mathematical theorist.

This represents at least a fair organization of data that is under present conditions more or less used, but in poorly-organized form.

ILLUSTRATION OF THE ADVANTAGES OF SUCH A SCALE.

Last summer the writer was talking with a university administrator who has been unusually successful in placing a large number of teachers in the Middle West to the satisfaction of all parties concerned. He attributed his success in this respect to the fact that he had gained the confidence of many school officials needing to secure teachers mainly through his ability to appreciate their requirements and through his absolute candor in discussing with officials the merits and weaknesses of the different teachers available for any positions

they had to fill. For instance, in response to a request for a certain grade of teacher: "We have at present no teacher available who quite measures up to your requirements, though Miss A comes near it. She is about the same type of teacher as Miss X, whom we sent to your friend, Superintendent B, about a year ago, though as yet somewhat less scholarly," etc. In reply comes the telegram: "Send her along." Later comes the request: "Send us a teacher for such and such a grade of work if you have one that you consider satisfactory."

In a similar way the cumulative scale would enable the institution possessing it to give increasingly definite information which should carry confidence with it. Some of the flowery language concerning the candidate which is ordinarily thrown in along with the certification as to his scholarship and training for the particular position in question could be dispensed with to make room for such statements as the following: "Mr. A has been rated in general mental ability by our faculty on a scale containing the names of our most advanced students arranged in order of merit. The scale contains also the names of former graduates similarly arranged. His position on the scale is represented by the grade $+2.14$, *i. e.*, a deviation of 2.14 above the median for students of Ph.D. calibre. You will notice that this point on the scale is practically the same as that indicating the status of Dr. C., a graduate of 1910, now professor of psychology in the University of K. In the past ten years we have had only two students majoring in the department of History of Education who were higher than this, *viz.*, Dr. E., a graduate of 1906, now professor of education in the University of O., and Dr. G., etc. It is very little below the estimated status of Professor H, of whom you probably know. You would evidently be fortunate to secure the services of Mr. A. As to initial salary, those graduates of last year who most nearly parallel him on the official scale received \$2200 and \$2500, respectively."

Such statements are similar in character to statements now made in private conversation, but are more definite and accurate. It is not claimed that a candidate's position on this scale is a guarantee of just how difficult and responsible a position he can fill, but it is claimed that it would be a means of representing more definitely and accurately than we now

state it what is to be expected of any particular man. Confidence in the recommendations made would be correspondingly increased.

While the system here outlined would enable an appointment secretary to rate only the best-known persons coming under his jurisdiction, the head of any single department with few students in it each year could easily keep his own private cumulative scale, containing only the names of students majoring in his department.

It would also make it easily possible to rate with a far greater degree of satisfaction than is possible at present, the person who is well known to only one or two professors. A person is not necessarily inaccurately rated if the rating is done by only one or two judges, *provided the judges are good judges*. We do not say that a case in court is unfairly tried just because the responsibility of determining the verdict rests with only one judge. We must be careful to keep in mind all of the variables that function in the matter under consideration. The quality of each judge is a factor which is often of equal or greater importance than the number of judges. Having the cumulative scale as a standard of measurement, provided (1) that a professor knows well a considerable number of the persons whose positions are represented on the cumulative scale, and (2) that he knows well the student to be rated, it is not expecting too much of human nature that his judgment alone should place the student's relative mental status on the scale with a satisfactory degree of accuracy—a far greater degree of accuracy and definiteness than would be possible without the use of the scale. This is the extreme case. It should rarely happen that a student in residence for one year would not be well known to at least three teachers.

Further applications will easily be suggested. Besides its immediate practical value, such a scale would provide much needed data for enabling us to correlate success in after life with predictions of success, made upon entering one's professional career. This, in turn, would be valuable material in aiding us in the analysis of those factors that make for practical success.

THE ELIMINATION OF FRESHMEN FROM THE UNIVERSITY OF TEXAS.

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(Contributions from the University of Texas Educational Laboratory, No. 1.)

The study of elimination from the lower schools has attracted a great deal of attention during the past few years, but elimination from college has received very little study, and the conclusions drawn have too often been mere generalities inaccurately based upon class populations. Such a basis does not truly represent individual elimination, since it does not take into account the elimination that is offset by those entering with advanced standing. Equally inaccurate is the "student history" plan which fails to take into account the modifying factors of retardation and acceleration.

In the present study both of these bases have been used with the modifying factors mentioned. Each name in the freshman lists of the University of Texas catalogues for 1901 to 1908 was traced through the sophomore lists of the year following, the junior of the next year and the senior of the next, or until the name failed to appear. If it failed to appear in the sophomore list, search was made in the next catalogue to see if it appeared as a second year freshman. If found there, it was dropped from the other year and used as other freshmen of this year, but listed as retarded. If it did not appear there, the junior class list of this catalogue was examined to see if the student had skipped the sophomore class. This process was repeated for three successive years, unless the name appeared

sooner. The normal, the retarded and the accelerated pupils were kept in separate lists, and no name was recorded twice in the same class.

The record of this method is shown in Table I. The first column under each university class name represents the number of students accelerated for that year skipping the class before; the second column gives the number progressing year by year until they withdrew permanently, including those who withdrew for less than four years but advanced one class each year after returning; the third column represents the number retarded, their names appearing a second time in the same class.

TABLE I.

Year.	Freshmen.			Sophomore.			Junior.			Senior.		
	Ac.	Nor.	Ret.	Ac.	Nor.	Ret.	Ac.	Nor.	Ret.	Ac.	Nor.	Ret.
1901.....	..	246	..	..	..	..	..	..	..	..	..	..
1902.....	..	148	12	..	106	..	..	..	..	..	..	..
1903.....	..	150	26	..	66	2	3	56	..	..	..	..
1904.....	..	266	19	..	92	1	..	40	..	9	40	..
1905.....	..	333	29	..	123	2	2	40	..	6	31	..
1906.....	..	339	39	..	154	11	4	82	5	7	20	..
1907.....	..	373	48	..	137	6	5	78	..	9	32	..
1908.....	..	305	46	..	114	14	2	77	..	7	43	..
1909.....	86	14	2	55	..	8	56	..
1910.....	11	30	..	5	28	..
1911.....	9	32	..
Total.....	..	2160	219	..	876	50	29	458	5	60	282	..
Class total.....	2379			975				552		342		
Per cent. of entrants	100			40				23		14		

To determine the elimination, retarded pupils are included, since they have been counted but once; and accelerated pupils, having skipped a year officially, but not in actual work done, are added both to the class in which they stand and to the one preceding. This gives the percentages at the bottom of the table, and also those upon which Figure I is based. The percentages for Figure I, however, are worked out for each separate year. The lines, showing this graphically, cross to the following year under each successive class. The heavy line represents the percentages of the totals given in the table above.

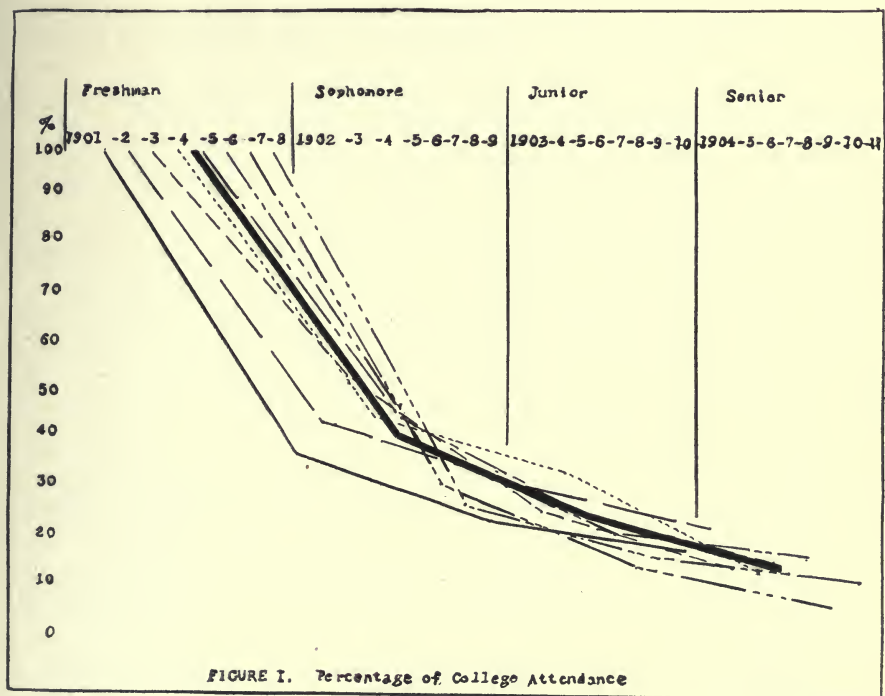


Table II gives a comparison of the results obtained in this study with the data secured by Strayer¹ from twenty-seven colleges having over five hundred students each. His figures are based on class populations, those in this study on student histories in one column, and on class population in the other.

TABLE II.
Enrollment in
Twenty-seven Colleges (S.), Univ. of Texas.—

	Range.	Med.	Mid. 50%.	Med.	Hist.	Pop.
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Freshman.....	100	100	100	100	100	100
Sophomore.....	40-100	76	65-92	79	40	49
Junior.....	25-100	57	42-71	57	23	33
Senior.....	12- 90	46	30-67	49	14	31

It will be seen that the University of Texas computation on the basis of student histories gives appreciably lower percentages than by class population, and it may be assumed that the same would be true of Strayer's figures. As explained above, class populations include all pupils who enter with advanced standing, while student histories include only those pupils who enter as freshmen.

The extremely low percentage of freshmen who returned to the university led us to inquire into the causes of such conditions.

The result of a questionnaire presented to a freshman class of thirty-nine pupils showed that they studied on an average four and three-quarter hours per day per pupil, outside of class, while seniors in the high school; and studied six hours as freshmen in the university. They received an average grade during the last year at high school of 85 per cent., while they got only 70 per cent. at the university. Based on hours of work done, the university ranked them only two-thirds as high as the high school did. Data from so small a group were not considered conclusive, but they pointed to the fact that there is a wide difference between the standards of marking in the two systems, a difference which tends to dishearten students when they enter the university.

¹GEORGE DRAYTON STRAYER. *Age and Grade Census of Schools and Colleges*. Bureau of Education, Bulletin, 1911, No. 5, p. 137.

Subsequently, through the courtesy of the school of English, the following questionnaire, seeking the opinions of the students on the reasons for elimination, was put into the hands of six hundred freshmen:

1. Name.....
2. High school from which you graduated.....
3. Number of courses carried in high school.....; in the university.....
4. Average number of hours studied per day outside of class: (a) the last year in high school.....; (b) this year in the university.....
5. Number in order of importance, with "1," "2" and "3," the causes below that are likely to have the greatest influence toward inducing you to leave school before the end of the second year:
 (a) Ill-health; (b) lack of money; (c) discouragement because of low grades; (d) tired of school; (e) not getting what was expected.

The students were given two days in which to reply, so that the answers would be carefully considered. Into the three hundred and eight replies, forgetfulness, carelessness and misunderstanding entered, but I believe that the averages show rather reliable tendencies and conditions.

Table III gives the courses carried and the hours studied in both the university and the high school:

TABLE III.

Courses carried	1	2	3	4	5	6	7	8	9	10
By university students....	..	1	5	84	190	3	..	..	..	..
By high-school students....	..	1	4	52	158	55	26	7	1	..
Hours studied	1	2	3	4	5	6	7	8	9	10
By university students....	1	14	34	58	64	56	28	18	5	7
By high-school students...	23	66	58	72	39	25	5	10	..	..

The average number of courses carried per student in the university was 4.63, in the high school, 5.09; of hours studied per day outside of class, in the university, 5.11, in the high school, 3.61.

Table IV gives the opinions of the students on causes that were most likely to lead to their elimination from the university:

TABLE IV.

Importance.	Disap- pointed.	Low grades.	Money.	Health.	Tired.
1st	37	63	113	91	18
2d	52	64	65	79	20
3d	63	68	33	41	39

While the figures given as second and third rank of importance do not seem valuable, those in the first rank do seem significant. "Lack of money" is by far the most prominent, followed in order by "Ill-health," "Disappointed" and "Tired of school."

Figure II shows the scholarship standing as taken from the Registrar's office, of the different groups of students according to their indication of the first cause of elimination. The top lines represent average grades in the high school, those immediately below, average grades in the university. The dotted lines represent the difference in grades received.

It will be noted that the high school grades are about 16 per cent. higher than those of the university, and this does not take into account the fact that students spend more time at study in the university than in the high school. This condition corresponds very closely to that found in the test of the thirty-nine students mentioned before.

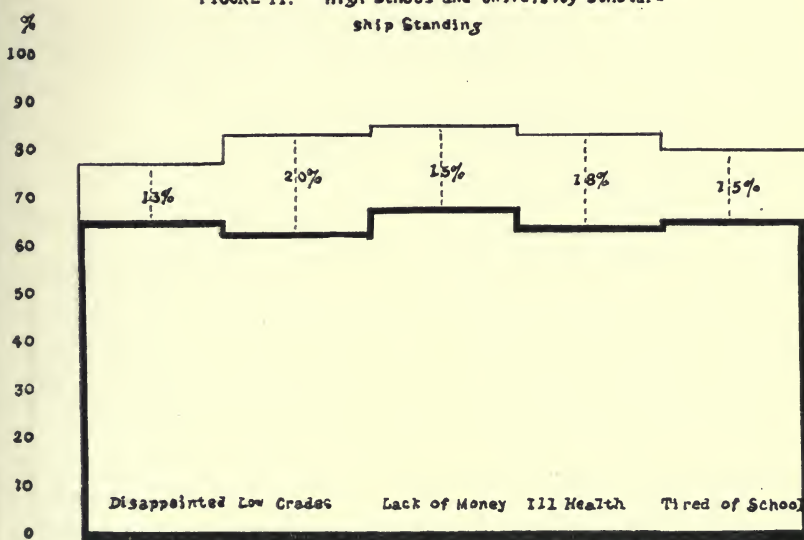
Figure III represents the minutes studied in the university per subject per day outside of class by the average freshman answering the questionnaire. The grouping is the same as that in Figure II.

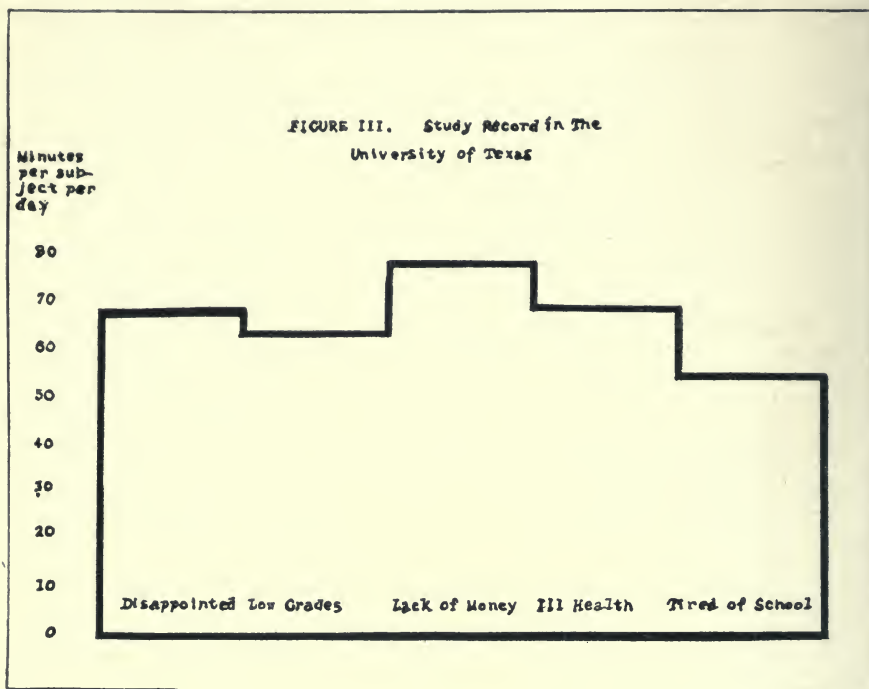
We see that students with the least means study most, and those "tired of school" study least; those who make the lowest grades are next to the bottom in the amount of study. This is what one would expect.

A similar questionnaire was sent by means of return postal cards to eight hundred and fifty freshmen who had registered during the sessions of 1910-11 and 1911-12, but who had failed to return. Only one hundred and eight replied. More than half of those replying had no high school records in the Registrar's office, having entered on individual approval. Of those replying, nine were attending school elsewhere and fifteen meant to return to the university soon. The results, therefore, are not as complete as could be desired, but serve to corroborate the tentative conclusions drawn from the previous inquiry.

In tabulating the answers the second and the third causes of elimination were so few and so unsatisfactory that they were disregarded altogether. The first causes were as follows:

FIGURE II. High School and University Scholarship Standing





"Ill-health," 20; "Lack of money," 54; "Discouraged because of low grades," 5; "Tired of school," 9; "Not getting what was expected," 5; other reasons, 15. Here as before "Lack of money" far out-numbers the rest, with "Ill-health" as second. However, those who were "Tired of school" occupied a higher place.

Tables V to VII show the results of this study:

TABLE V.

Hours Studied.

Hours studied	1	2	3	4	5	6	7	8	9	10
By university students. . . . .	..	2	15	13	16	10	1	8	1	1
By high-school students.	3	25	16	13	4	2	4	4	..	..

TABLE VI.

Average Hours Studied by Each Group.

Group.	Students.	Hours in the university.	Hours in high school.
Health	20	2½	4¾
Money	54	5	3¼
Discouraged	5	6	4
Tired	9	4	3
Disappointed	5	4	2

TABLE VII.

Scholarship Standing.

Group.	Students.	Grades in university.	Grades in high school.
Health	4	D—	B—
Money	16	C+	B
Discouraged	2	D—	B
Tired	5	D+	..
Disappointed	2	B—	A—
Others	14	C	B+

Reducing to arbitrary percentages, as was done in the former studies, by giving A the value of 90 per cent.; B, 80 per cent.; C, 70 per cent.; D, 60 per cent., and E, 50 per cent., we find that the difference between the standards of grading in the two systems is again about 16 per cent. Of the students who did not answer the card, the grades of one hundred and forty-one, found in the Registrar's office, showed a difference of 13 per cent. From these figures it was also discovered that the

students having the lowest grades in the university failed to answer the cards.

CONCLUSIONS AND RECOMMENDATIONS.

1. About 60 per cent. of the freshmen withdraw permanently each year from the university.

2. Lack of means causes about 34 per cent. of this elimination. Is it not the duty of the State to furnish such allowances by means of scholarships as would meet the needs of able and worthy students?

3. Ill-health causes 28 per cent. of all elimination. Most of this may be charged to the student himself, but the State should furnish adequate and sanitary dormitories and other buildings urgently needed.

4. A small percentage of elimination is caused by inability and lack of effort on the part of the student.

5. About one-third of all elimination is caused by the fact that the scholarship rating of freshmen in the university is only two-thirds of the rating of the same students in the last year of high school, when based upon the actual amount of time spent in study. The serious break in a student's standing when he enters the university tends to discourage him and to drive him out of school.

The university should raise its scholarship rating of freshmen students about 10 per cent., or one letter, according to the system of marking in use, and the high schools should lower that of their senior classes about the same amount. This would close the unnatural and harmful breach between them, and would reduce this large percentage of elimination.

6. Students lacking means study longer and make better grades than those of any other group. Those who are tired of school study least of all and make relatively low grades.

PROBLEMS IN THE EXPERIMENTAL PEDAGOGY OF CHEMISTRY.

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The justification for including a subject in the curriculum of the secondary schools is either that through the study of it the pupil shall acquire useful information, or that it is well adapted for developing him mentally. The multiplication table is learned because it is useful in after life; it is a time-saver. Geometry, on the contrary, is taught not because it is essential to the majority of high school graduates, but rather because it is said to afford an excellent means of mental training. Luckily, the study of most subjects not only imparts useful information, but at the same time tends in some degree at least to increase the mental capacity of the pupil. That chemistry belongs to this latter class will scarcely be doubted by anyone at all familiar with the subject. In addition to a large number of very desirable facts, it offers excellent opportunities for training in manipulation, in specifically directed and intensive observation, in the correlation of ideas, and in logical reasoning. It should also stimulate the visualizing and creative imagination, foster the spirit of investigation and verification, and contribute toward the development of the so-called scientific spirit which, in the last analysis, is none other than the desire for truth.

From a consideration of an overcrowded curriculum the educator in a secondary school is called upon to decide whether or not chemistry offers equal or greater advantages than do other subjects for development along the lines just indicated. The field opened by the study of chemistry is very comprehensive, and it may be argued by some that this fact militates against material progress in any one direction.

Closely associated with the question of the desirability of

teaching chemistry is that of the amount of time necessary to give tangible results in the subject, and the manner in which this time shall be distributed. Is it, for instance, worth while to spend one year—approximately two hundred hours—on chemistry and then stop? Or would it perhaps be more efficacious to concentrate less and distribute the time over two or more years? Nor is that quite all. There must be due consideration of the manner and time of introducing this study. These are questions that can be answered partially at least by experimental investigation, and the possible lines of attacking the problems will be suggested under specific headings in the course of this discussion.

In order to determine the progress that has been made as the result of the pursuit of any given study, standards of measurement and methods of testing the results must be devised. Where the effect of the teaching is definite and tangible, the standards and tests are correspondingly simple and direct in their bearing. Spelling and drawing are taught in order that the pupil may be able to spell or draw, arithmetic to enable him to determine with facility and accuracy the amount of the grocer's bill or the contents of a pay envelope. The complete effect, however, of the teaching of these subjects may be much wider than this, and, as a result, more difficult to measure by any experimental method.

The few elementary facts of chemistry that are acquired and retained by the average high school pupil are of little value to him unless he can follow up the study after he has left the secondary school either in an institution of higher learning or in a trade in which he will use chemical processes. This will be the case with the smaller proportion of the pupils, as the majority of them will go into occupations where no such practical use of chemistry is made. The time spent by them in this study in the high school would be wasted, therefore, unless they have derived mental training along some one or all of the lines indicated in the opening paragraph. Although such training is difficult to measure, because of its intangibility, it is nevertheless in this direction that we must turn our attention if we are to obtain experimental evidence of the comparative value of the work.

It is not within the scope of the present article to discuss at length the nature of the tests best suited for the purposes of this sort of investigation. That is the province of experimental education; and it will doubtless be found that the methods at present employed in other branches are applicable in this new field of research. In general, it may be said that any tests applied must be made with the pupils before, during the progress of, and at the conclusion of the course. The same tests must be made with pupils taking courses other than chemistry, and the advancement of the various groups compared. Finally, these tests, to be of any real value to the educator, must be made on large numbers of pupils in many different schools in order to eliminate as far as possible the personal factors involved in the teacher and the type of pupil.

Let us next turn to a detailed analysis of the topics mentioned in the first paragraph of this article, and to the consideration of their fundamental and dynamic relations to the intellectual growth of the pupil.

MANIPULATION.

The problem of the education of the young by the use of the hands is a vital one, whether in the home, the school or the factory. It is pertinent in experimental chemistry because of the many opportunities for making, setting up and handling apparatus varying greatly in nature and use. Pupils on entering the course differ in a marked degree in inborn manipulative ability. To what extent this ability can be cultivated and improved by experimental work of such a special character is an interesting consideration for the educator. Furthermore, granting that improvement can be made, what should be the nature of the apparatus in order to increase the pupil's dexterity with the hands to the greatest possible degree in the time at the disposal of the teacher? The apparatus may be varied a great deal and less time devoted to any one mechanical action, or the operations may be repeated a great number of times until the pupil becomes proficient, as is necessary in successful glass-blowing. The handling of delicate apparatus, such as the chemical balance, should improve the

pupil's manipulative skill, but the results may not repay the outlay of time and energy necessary to obtain them.

Another point that demands attention in the consideration of the training of the pupil through the hands is the value of quantitative, or semi-quantitative, experiments as opposed to the purely qualitative. The latter tend to make the pupil careless and inaccurate in his habits, while the former are of necessity time-consuming. Last, but not least, the problem should be investigated as to whether the pupil learns to manipulate best by imitation (demonstrations by the teacher) or by being required to experiment with the apparatus until he discovers the most advantageous method or methods.

OBSERVATION.

Observation is, of course, of two kinds: that which is casual and that which is directed with some specific object in view. It is doubtful whether the study of chemistry will increase the power of the pupil to observe casually; but it would be interesting to have data on this point. The real problem, however, is whether the training he receives through the agency of chemical experiments enables him to observe more efficiently when called upon to do so in the ordinary occurrences of life, for it is with this end in view that we should endeavor to develop the pupil. The value of lecture experiments for the cultivation of observation is a question worthy of consideration in this connection. As a result of lectures copiously illustrated by experiments or of demonstrations given by the teacher, does the pupil's capacity for comprehensive observation improve materially? Now, it is true that a great deal of his knowledge in life is derived from observing the performances of others, hence it follows that the cultivation of his powers in this direction is highly desirable.

With regard to the experiments that the pupil is expected to perform himself, the question may be raised whether he should be given careful directions for the operations involved and left to observe all he can, or be warned to look for important points and for special phenomena. There is undoubtedly much to be said on both sides of the question, but at present we have little upon which to form definite opinions. If

the pupil is left to his own devices, he is liable to see the most spectacular phenomena only, and miss oftentimes the more vital. Take this instance. If a pupil is asked to record what he sees when copper filings and sulphur are heated in a test tube, he will probably note with the utmost care the exact manner in which the fumes of sulphur come off, missing entirely the fact that the reaction when once started will proceed by itself, causing the mass to become red hot on account of the heat generated. If this experiment was intended to show that some mixtures may burn without the presence of air, most pupils will fail to make the proper observation. This brings up another issue, *viz.*, precisely how can the pupil be trained to distinguish between the important and the minor or non-essential aspects? More than that, what is the educative value of the repetition of experiments when the pupil has omitted some important observations?

CORRELATION OF IDEAS.

From the fact that the pupil's knowledge of material things consists of relationships, similarities and differences, it follows that the recognition of these relationships by the pupil is of vital importance in acquiring a knowledge of chemistry. It is here, however, that the beginner is confronted by one of his greatest difficulties. He is met by a bewildering array of new facts and complicated phenomena. He is obliged to employ new processes of thought, and to express himself with exactitude (perhaps for the first time in his life) by means of a vocabulary where even the terms and expressions are unfamiliar to him. It is not astonishing, therefore, that the pupil should have difficulty in realizing the connection between ideas in a subject that presents so many new experiences to him.

It would be a fruitful line of research to investigate what can be accomplished by way of inducing the pupil to correlate fact with fact, fact with theory or theory with theory. It is still more important perhaps that he should connect what he learns in chemistry with the phenomena encountered in everyday life. A question for careful consideration here is the effect of closely-connected experiments on the pupil as a test

of his tendency to correlate. In other words, it behooves the teacher to ascertain whether the experiments the pupil is called upon to do should be chosen to illustrate the specific point at issue regardless of their connection with one another, or whether they should be correlated as much as possible. For example, combination of synthesis can be illustrated very well by heating magnesium or lead in the air, and metathesis by mixing a colorless solution of lead acetate with a reddish brown solution of copper chromate. In the latter experiment the double decomposition is manifested by the resulting blue liquid and the yellow solid. The same two changes may be equally well illustrated by heating copper and sulphur together, showing combination, and treating the copper sulphide thus formed with nitric acid to give an example of metathesis. Until we have evidence to the contrary, it would seem that the pupil's chances of realizing the relation between synthesis and metathesis would be greatly enhanced by having the experiments illustrating the two phenomena closely connected, yet this is a device seldom made use of in our laboratory manuals of chemistry.

Before concluding the discussion concerning the correlation of ideas, it might be pointed out how this close association between experiments may be extended to a very considerable degree. For instance:

1. Solid copper nitrate, which the pupil can make by evaporating down the solution obtained from the experiment with copper sulphide and nitric acid, may be left standing exposed to the air whereby the solid takes on moisture, thus illustrating deliquescence.

2. A few lumps of the solid placed at the bottom of a tall breaker or flask filled with water shows nicely how a dissolved substance diffuses throughout the entire liquid.

3. Copper oxide may be made by heating the nitrate, and it may also be made by heating copper in the air.

4. Copper hydroxide is easily obtained by adding a base, such as sodium hydroxide, to the nitrate.

5. Copper, copper oxide and copper hydroxide treated with nitric acid are typical examples for the formation of a salt.

6. Nitric acid, because of its volatility, can be driven from

its salts by heating them with sulphuric acid, as instanced by the formation of copper sulphate from the nitrate.

7. The water of crystallization of blue vitrol may be expelled and added again at will. In this manner the pupil acquires the idea of hydrates.

LOGICAL REASONING.

Generalizations, involving as they do one or more judgments or conclusions, are not only the necessary result of the study of any subject, but are made by every man in every walk of life; it matters not whether he sells typewriters or occupies the speaker's chair. These judgments will be justifiable only in case the premises upon which they are based are correct. The trouble with the untrained and the prejudiced man is that he often does not examine these premises carefully enough to be able to determine their validity. Now, this examination of the evidence is not so simple as it may seem at first sight. It frequently necessitates a form of analysis that is peculiar to the subject in hand, and is, therefore, largely dependent upon training. One common source of error is not being in possession of all the facts; another is the failure on the part of the reasoner to take into consideration all the facts he already has in his possession.

It would be no more reasonable to hold a man responsible for all the facts in every subject than it would be to expect him to be able to make all the manufactured articles on the market. It is within our rights, however, to insist that he should realize when facts fail him, and also that in such cases he is either not capable of passing judgment at all or his conclusions are only tentative and subject to revision on the presentation of further evidence.

Chemistry offers abundant opportunity for training the mind in the examination of evidence, and also for the forming of judgments, both tentative and final. The processes of thought are often very complicated, because of the element of uncertainty that enters into the premises upon which the deductions are based. So far in the pupil's career he has been accustomed to reason from axioms more or less self-evident, but has rarely been required to test the accuracy of funda-

mentals before arriving at his conclusion. A few illustrations will make this quite clear. In geometry the student begins with axioms, and the result follows logically therefrom. Witness the following example: The sum of the angles made by three straight lines completely enclosing a finite plane surface is equal to two right angles. This is of the nature of an imperfect induction, because there is an infinite number of such triangles possible. Yet the proof of a single case serves to make the pupil confident of the universal truth of the proposition. In an attempt to apply a similar line of argument to a case in chemistry difficulties are liable to be met with. For instance, the pupil who has been working with solutions of copper salts, such as the chloride, sulphate, nitrate or acetate, would very likely come to the conclusion that all copper salts give a blue color in water and a precipitate with hydrogen sulphide. His conclusion is, of course, fallacious, for if sufficient potassium cyanide is added to the solution of any of the above-mentioned copper salts, the blue color disappears, and hydrogen sulphide fails to give the anticipated precipitate.

The following subtle case is even more disconcerting to the young pupil. Experience leads him to believe that the rate of a reaction (rate being defined as the amount changed in the unit of time) is proportional to the temperature. For example, if he heats copper, it oxidizes more rapidly than it does at room temperature. Lead, iron and tin behave similarly. Barium oxide heated to 500 degrees centigrade obeys the same law, and takes on oxygen to form barium dioxide. If the law holds up to 500, it should hold at 1000 degrees; yet the pupil will find that it is impossible to form any large amount of barium dioxide at this temperature. In the light of this experiment it would be natural for him to suppose that the law had some exceptions. A little more experience, however, will teach him that the law is probably of universal application, and that the case of barium oxide and dioxide is a striking illustration of its validity. The explanation of the unexpected result is that the decomposition of barium dioxide is also proportional to the temperature, but that the temperature co-efficient of the decomposition is much greater in the neighborhood of 1000 degrees than that of the formation. As a

consequence, barium dioxide is broken up at high temperatures just as fast as it is formed.

We see from these considerations that deductions in chemistry are often fraught with great danger, because the premises are so frequently of the nature of imperfect inductions. Viewed from the standpoint of the pupil's training, this uncertainty should be a blessing in the hands of the skillful teacher.

The foregoing paragraphs have been leading up to the question of the choice of experiments for laboratory work. Many teachers contend that they should be kept as simple as possible, with but a single object in view. That this is desirable at first can scarcely be doubted by anyone. It is not so clear, however, just how far this policy should be continued. How is the pupil to learn to test his premises if we do not frequently give him the opportunity? Much experience has convinced the writer that continued plain sailing and simple examples tend to make the pupil unguarded in his conclusions, and lead him to form hasty judgments. The following experiment is a very good instance of a correction for this error: The pupil is given directions to melt, but not boil, potassium chlorate and test for oxygen with a glowing splinter. Next he is to add a portion of manganese dioxide and again test. Oxygen is now given off copiously, and most pupils conclude at once that manganese dioxide is thus proved to be a catalytic agent. A little reflection soon convinces them that from this experiment, as they have performed it, there is no proof as to whether the potassium chlorate, the manganese dioxide or a chemical reaction between the two is responsible for the evolution of the oxygen. It would be very instructive to test the effect of experiments of this type on the ability of the pupil to analyze carefully the evidence before him.

As has been already pointed out, another very common source of error is the failure on the part of the pupil to interpret results in the light of his previous knowledge. In fact, this is one of the most difficult problems the pupil has to face in his struggles with the subject. There are usually so many facts that must be brought to bear on the question at issue that the pupil becomes confused. For instance, he will prob-

ably conclude that hydrochloric acid contains free chlorine because starch paper turns blue if held in the vapors from a boiling solution of hydrochloric acid and potassium iodide. He forgets that hydriodic acid is not very stable and breaks down at the temperature at which he made his tests. Experiments of this nature involve reasoning from analogy, a very effective agent or a dangerous pitfall in argument, depending upon the ability of the reasoner to use it judiciously or otherwise. These experiments are splendid opportunities for correlation. Their effect where the pupil is called upon to concentrate many points of view on a single issue should be systematically investigated.

Another problem for research is whether the pupil should clearly understand the object before he begins the experiment or be left to conclude what the purpose was from the results he obtains. The scientist presumably knows what he is trying to show by his experimental work; but this knowledge often tends to make the pupil prejudiced, and therefore inclined to misinterpret his results.

IMAGINATION.

Imagination, although differing somewhat in kind and application, is just as essential for construction and invention in science as it is in literature or art. Chemistry is fertile soil for the growth of this important capacity, because of the many opportunities for visualizing, and for constructive problems. By constructive problems is meant those where the pupil is required to suggest the method of procedure and the apparatus necessary for the illustration or proof of the point under discussion. They need not be difficult, but should make demands upon the ingenuity of the pupil. This method of teaching is doubtless more time-consuming, as far as the accumulation of facts is concerned, but it is a question whether the pupil has not gained more at the end of the course. Data on this point are badly needed, especially in the case of pupils who have little or no natural ability for invention. While they are very much in need of developing in this direction, it may be that the headway made would not be great enough

to warrant the employment of so much valuable time. As to the type of the constructive problems, the pupil might be asked to suggest possible experiments to illustrate or prove the point under consideration. The difficulties in the way could be pointed out by the teacher or by other pupils, and means of overcoming these difficulties devised by the class. Variation in the apparatus employed for the same experiment offers opportunities for the development of mechanical inventiveness.

In the matter of visualization it would be of value to know what would be the effect of requiring the pupils to predict and describe before the experiment is performed what they expect to see during the operation. It is quite possible that many pupils would have such fixed preconceptions that they would lose more in open-mindedness than they would gain by the play of the imagination; but if proper guidance is given by the teacher, this should prove a valuable exercise to develop the power to visualize constructively. Another device to cultivate visualizing would be to have the pupils construct apparatus from description without the use of sketches or diagrams.

THE SPIRIT OF INVESTIGATION.

One of the difficulties in laboratory work with young pupils is the fact that most of them prefer the striking or spectacular. They would much rather make an explosion, or silver a mirror, than experiment with the object of deciding some disputed point. The desire to find out for himself and the willingness to examine the evidence are attitudes of mind so important that their development in the pupil is worthy of the most strenuous efforts on the part of the teacher. Such researches as have been suggested under the preceding heading would go far to reveal the best means of securing these attitudes of mind.

COMMUNICATIONS AND DISCUSSIONS.

AN EXPERIMENT IN THE LEARNING OF FOREIGN WORDS.

The purpose of this experiment was to ascertain the relative efficiency of different methods of learning the meaning of words in a foreign language. The two methods tested were: (a) Reading to get the meaning and looking up the unknown words in a dictionary as encountered; and (b) looking up in a dictionary words encountered in a formal list. The factor really tested was the associational influence of the context in fixing the meaning of the new words encountered.

The language selected for the experiment was German. The subject was fifteen years ago quite familiar with this language, spoke it with some hesitation, wrote it quite freely, and read it rapidly and without difficulty. His use of it then, however, was almost wholly literary, hardly at all scientific. He discontinued all use of it from 1899 to 1906, and since then has used it only in occasional and very limited bits of scientific reading. He finds himself reasonably ready with the inflected system and with the movement and structure of sentences, but slow and hesitating in the actual process of feeling his way through the meaning, and markedly deficient in vocabulary. He often sees the grammatical structure of a sentence quite clearly, without being able to fit it logically into the context. He believes this is not entirely due to gaps caused by ignorance of the content of individual words, but partly to the imperfection of the complex of associations involved in the web of discourse, through long discontinuance of practice.

The two methods used in learning words have been described. In both methods the meanings were merely attended to with some energy once. There was no repetition and no writing of meanings, except in a mechanical sort of way for purposes of record and without vivid attention to the meaning. It is believed that these writings had a negligible effect on the fixing of the meanings in memory.

If a word was encountered a second time in contextual learning, record was made as to whether it was remembered or not. If not remembered, it was then looked up again. A short time after finishing the reading (from one-half to two hours), after an interval of some other occupation, the list of words looked up was read to the subject by an assistant, with the omission of such as had already been encountered a second time. Record was made as to whether he remembered them. Thus there was in the main fairly secure provision that each word should be encountered twice, and only twice, on the first day of the experiment involving it. If the subject did not remember the word on the second presentation, its meaning was told to him.

TABLE 1.

Results of Learning Foreign Words in Context and in Lists.

(Percentages are based on total number learned.)

	I context first trial.		II list first trial.		III list second trial.		IV context second trial.		I and IV context both trials.		II and III list both trials.	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Words learned.....	17	....	17	....	17	....	17	....	34	....	34	....
Words remembered 2d presentation (same day)	15	88.2	14	82.4	13	76.5	13	76.5	28	82.4	27	79.4
Words remembered after 24 hours	17	100.0	15	88.2	14	82.4	15	88.2	32	94.1	29	85.3
Gain on 3d presentation	2	11.8	1	5.9	1	5.9	2	11.8	4	11.8	2	5.9
Advantage in method...	{ On 2d presentation.....								1	3.0		
	{ On 3d presentation.....								3	8.8		

In the learning of lists of words (Categories II and III, Table 1) an effort was made to keep all the conditions of the experiment identical with those in the learning of categories I and IV, except that the words were not encountered in context. Lists were prepared by an assistant familiar with German; the subject looked over these lists and struck out those which he knew or thought he knew. The remainder furnished the material presented in the lists.

After each series of words had been presented the second time, twenty-four hours was allowed to elapse. The words were then again presented and a record made. After this third presentation the succeeding series was presented for the first time.

Four series of words were used; the first and fourth chosen from

the context, and the second and third from formal lists. No practice effect appeared, and this feature is consequently not included in Table 1, which gives the results of the learning in terms of the number and percentage of words remembered on the second and third presentations.

TABLE 2.

Effect of Practice in Reading on the Guessing of Word-Meanings.

	Total words.		Unknown words not guessed.		Unknown words guessed.	
	No.	%	No.	%	No.	%
First trial	266	...	17	6.4	19	7.1
Second trial	399	...	20	5.0	11	2.2
Difference	133	50.0	..	1.4	..	4.9

In the reading (I and IV, Table 1) account was also taken of the time, the total number of words read, and the number of words whose meaning was guessed and found upon reference to the dictionary to be correct. These results are set forth in Table 2. These words are not included in the lists given in Table 1. For the sake of greater accuracy in comparison, the reading was continued for exactly one hour each time. The material read was from Pohlmann, *Beitrag zur Psychologie des Schulkindes*, Pädagogische Monographien 13: 3, par. 3ff. The time of day was the afternoon, varying usually from 1:30 to 4:30. One list was looked up and the test made after 7 P. M. The experiment proceeded without long interruption from August 14 to August 25, 1914. The subject meanwhile read no German except in connection with the experiment.

At the second reading (on August 24) it was found that twenty unknown words were encountered within the hour. These are all counted in Table 2, but for convenience of comparison only the first seventeen of those words were selected for further test, as that number had been made the basis of computation in the other tests.

In spite of the small number of words used, the results appear to be perfectly definite and unambiguous in meaning. Words encountered in context were remembered in both trials decidedly better than words encountered out of context. The advantage in favor of the context method is 3 per cent. of the whole number. That is, according to these results, 3 per cent. more of the total number of new words encountered will be recognized when next seen, if the new words were encountered in context, than would be the case if they were listed and looked up. Not only so, but the advantage is three times

as great for the recognition of the word after a twenty-four-hour interval. The experiment then is decidedly favorable to the much-decried text-and-dictionary method of enlarging one's vocabulary in a foreign language.

An interesting by-product of the experiment comes out in Table 2. It was noted in the discussion of Table 1 that the practice effect upon retention of words was negligible; that is, the percentage of words remembered on the second presentation after learning by either method showed no gain on the second trial by that method, and the gain on the third presentation was absolutely constant in the two trials by each method, being 11.8 per cent. for contextual learning and 5.9 per cent. for learning in lists.

Practice effect may then be eliminated as a factor in Table 2, so far as it concerns the number of words retained. We find there that the amount read per hour increased 50 per cent. on the second reading; that the percentage of unknown words not guessed at sight falls off 1.4 per cent. of the whole number of words, and that the percentage of words whose meaning is not surely known, but is guessed correctly, falls off nearly 5 per cent. of the whole number.

This means a marked gain not only in the rate of reading, but in sureness of association and confidence through consciousness of control of the process. It is believed that the difference between words which were really new to the subject and words which had previously been known but had been partially forgotten was becoming decidedly clearer. A distinction was also recognizable between unfamiliar words whose meaning was inferred from their formation (as *Ursache*, *annähern*, etc.) and words whose roots were unknown to the subject, but whose meaning was correctly inferred from the context. Latin synonyms also came spontaneously to the subject's assistance in many instances.

The experiment is an easy one to perform, and valuable for the teacher of foreign languages. It may be varied in many particulars, to test one method or another, or to isolate the influence of context, etymology, knowledge of other foreign languages, and various other factors, in increasing one's vocabulary. It cannot but throw light upon the processes through which the pupil passes, and give the teacher both sympathy with his difficulties and a sound technical resource for his aid.

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AN EXPERIMENTAL INVESTIGATION OF THE BOOK, LECTURE AND EXPERIMENT METHODS OF TEACHING PHYSICS IN ELEMENTARY SCHOOLS.¹

This investigation was undertaken to obtain a basis for a judgment on the best method of teaching elementary physics. Three methods were employed (referred to as the book method, the lecture method and the experiment method), and the classes of the seventh and eighth grades of Public School 84—Boys, Brooklyn, were so divided that each lesson in science was taught to each class of the same grade by a different method. Upon the completion of the series of lessons the classes were tested by uniform tests, and thus the effects of each method were noted. Some tests were given after a stated interval in order to ascertain how the impressions left by each of the methods were affected by time.

The series of experiments extended over the first and second school terms of 1911. During the second term many of the experiments of the first term were repeated for purposes of verification. Altogether there were 30 experiments in which the lecture, book and experiment methods were compared. The total number of boys that participated in these experiments was about 500. The average age was 13 years 10 months. The total number of test papers corrected was 3280. To this number the book method classes contributed 1114, the lecture method 1072, and the experiment method 1094. In all, about 18,500 individual question were answered and corrected.

The sum totals of the average per cents that the book, lecture and experiment methods attained are as follows: Book method 1555, lecture method 1891, experiment method 1949 total per cents. On the basis of *average per cent. attainments*, then, the experiment method produced the best results. The lecture method, a close second, is only 58 units below the experiment method, while the book method is far behind.

The experiment method produced the highest average per cents in 16 of the 30 experiments. In four of the experiments the average per cents were the same as in the lecture method. In only one experiment did it take third place. In two experiments it tied with the book

¹Author's abstract of a thesis for the Ph.D. degree at New York University. The original thesis, of which this abstract presents a fragmentary summary, is a typewritten manuscript of 386 pages, and may be consulted for further details at the library of New York University.

method for second place. In the remaining seven experiments the experiment method takes second place.

The lecture method produced the highest average per cents in 10 of the 30 experiments. In four the per cents were the same as in the experiment method. In 13 experiments it takes second place. In three experiments it takes third place.

The book method did not produce the highest average per cent. in any experiment. In one it tied with the experiment method for first place, in three it was distinctly second, and in one it tied for second with the experiment method. In the remaining 25 experiments it produced the lowest average per cents.

Eight of the thirty experiments are repetitions of the corresponding experiments of the term before. In the experiment method four first term conclusions are confirmed and four are not. In the lecture method three are confirmed and five are not. In the book method seven are confirmed and one is not. This indicates that the conclusions (as far as these eight experiments are concerned) regarding the book method are firmly established. The conclusions regarding the experiment and lecture methods (as regards these eight experiments) are open to doubt. Further extended investigation might be profitably undertaken.

Twelve of the experiments are 'interval' experiments, *i. e.*, with the test separated by a stated interval from the lesson. In eight of these twelve experiments the experiment method came out first; in two it tied with the lecture method, and in one with the book method for first place. In one experiment it takes second place.

The lecture method attained first place in one of the 12 interval tests; in two it tied with the experiment method for first place. Seven times it attained second place and twice third place.

The book method tied with the experiment method for first place once, and once it attained second place. In the remaining 10 experiments it was third.

This indicates that the impressions left by the experiment method are the most permanent; those left by the lecture method less permanent, and those left by the book method least permanent.

A "combination method" (experimental demonstration plus note-book work) was compared with the other methods in five experiments. In four of the five experiments its average per cents were far below those of the lecture method, in two experiments its average per cents

were much below those of the experiment method, and in two experiments its average attainment was about as good as that of the experiment method. Although we have only five experiments from which to draw our conclusions, the value of notebook work seems to be seriously discredited. Further experimentation in this direction is highly desirable.

The total time consumed by each method is: Lecture method, 121 minutes; experiment method, 143 minutes; book method, 232 minutes. This would mean that the book method is very wasteful of time; the experiment method less so, and the lecture method least so. An undue proportion of the total time in the book method comes from experiments involving quantitative work, to which three full periods were allowed. Excluding the exceptional cases, we find that, as far as the actual teaching of a lesson is concerned, the time consumed by each method is about the same. This leaves out of consideration the time spent by the teacher in preparing lessons. From the teacher's point of view, the methods in the order of least time consumption are: 1st, book method; 2d, lecture method; 3d, experiment method.

"Interest is the mother of attention." Without interest there is no attention and without attention intelligent work cannot be done. The book method of teaching elementary science did not prove interesting to the boys. Only in rare cases was curiosity aroused on account of the novelty of the method.

On the other hand, the lecture method proved to be most interesting. It seems that the element of personality is the important feature of this method. Not one case is recorded where this method failed to arouse and hold the attention. In experiments where the work was largely quantitative in nature the lecture method far excelled the other two. This was largely due to the ease of grasping clear explanations. The boys were not aroused to superior thinking, but merely remembered and imitated the explanations given them.

It is hard to say whether or not the experiment method was as interesting as the lecture method to the boys. Certain it is that in the lecture method attention and interest were directed to the essentials of each lesson, while in the experiment method such interest and attention were necessarily divided between the lesson, itself, and the apparatus that was used.

Of the three methods, the book method was the most fatiguing. Mind-wandering, yawning, staring, stretching, inattention and list-

lessness were invariably noted. The lecture and experiment methods had about an equal share in reducing fatigue to a minimum.

It was demonstrated, again and again, that not only are boys of elementary school age unable to get the thought by means of symbols from the printed page, but that even simple diagrams did not prove of much benefit. If the pupils remembered anything, they remembered words, and not ideas. In several cases a simple diagram was reproduced without the slightest conception of its significance. On the other hand, the concrete and detailed presentation in the experiment method proved of great aid in reproduction. In other words, concrete memory images were reproduced more readily than verbal or auditory memory images.

The book method failed to produce good results either in thought or in memory work. It cannot be said, however, that the experiment method and lecture method were particularly successful in arousing the boys to original thought. Judging from the character of the answers that were given by the classes, it is safe to say that the book method class depended too much upon memory. If the exact statement of the book was forgotten, the answer was usually incorrect. There was no attempt to reach an answer through a process of sound reasoning. The ingenious "inventions" that the book method class frequently resorted to are not indications of sound reasoning. On the other hand, the lecture and experiment method classes, especially the latter, showed more power of independent thought and self-reliance.

Further points emphasized by various aspects of the experiments were that repetition of subject-matter, with an extended intervening period for study, results in a marked increase in efficiency as indicated by the tests; that the use of books in connection with science work helps the boys in the power of expression and has a wholesome effect upon the spelling of scientific terms, both new and old; that poor experimental demonstration is detrimental to efficient teaching, and that a teacher's judgment regarding a class with which he is familiar is usually correct.

The vote of the eighth-year boys showed that the experiment method was by far the most popular, receiving a total of 88 votes. The next in popularity was the lecture method, 23 votes, while the book method received only 11 votes.

CONCLUSIONS.

1. On the basis of efficiency as measured by percental attainments, by lasting impressions on the minds of elementary school pupils, by persistence in memory, by encouragement of independent thought and self-reliance, and by popularity among the pupils the three methods rank as follows: First, experimental method; second, lecture method; third, book method.

2. An the basis of minimal time consumption in the actual teaching of the lessons, of arousing and holding interest and attention, and of the minimal expenditure of mental and physical energy they rank as follows: First, lecture method; second, experimental method; third, book method.

3. On the basis of minimal time consumption by the teacher in the preparation of the lessons, they rank: First, book method; second, lecture method; third, experiment method.

4. The amount retained in thought work, as well as in memory work, in elementary science is inversely proportional to the length of time elapsing between the presentation and the test.

5. No particular hour of the day or position in the general program need be reserved for elementary science.

6. Carefully-written notebook work and neatly-drawn diagrams of science apparatus do not increase the pupils' knowledge of elementary science.

7. The work in elementary science must be concrete, and must be based on the daily experiences and observations of the pupil.

8. Elementary science in elementary schools should be largely, if not entirely, qualitative, and not quantitative.

9. As regards elementary science, elementary school pupils cannot get the thought from the printed page. Simple diagrams are of no material aid.

10. The book method of teaching elementary science might be used with fairly good results, provided the class were exceptionally bright.

11. Pupils who are taught by the book method show superior ability in the power of expression, and in the spelling of new scientific terms, as well as of familiar old terms.

12. Since the experiment and lecture methods approach each other in so many respects, either one may be profitably used. Each produces good results. An ideal method might result from a combination of the two.

J. EDWARD MAYMAN.

Brooklyn, N. Y.

ABSTRACTS AND REVIEWS.

ISAAC EMERY ASH, PH.D. *Fatigue and its Effects upon Control.* *Archives of Psychology*, No. 31, June, 1914. (University of Wisconsin Contributions to Educational Psychology, No. 1.) Pp. 61. 60 cents.

The author presents a general survey of the problems of physical and of mental fatigue, which is clear and in good perspective, though by no means exhaustive. From this survey he argues "that one of the chief symptoms or characteristics of natural fatigue, and one which represents most uniformly the relative effects of varying amounts of exertion, and hence furnishes the most reliable basis for estimating fatigue, is a loss of control in the execution of specific movements or in the performance of particular and highly specialized mental functions." This principle is quite neatly brought out by the author's experiments with muscular fatigue, which indicate that when curves produced with the ergograph decline as the work of lifting continues, there is really a corresponding 'spilling over' of energy into other muscles; thus, for instance, curves produced by connecting the second and fourth fingers with the graphic registration begin to augment in excursion when the curve produced by the third finger begins to decline in excursion. In short, the primary phenomenon is loss of control over the direction of muscular energy.

More interesting is the transference of this idea to the measurement of mental fatigue. The procedure finally developed is that of recording the rate at which various ambiguous figures (geometrical optical illusions, like the cube, the staircase, the pyramid) can be voluntarily reversed in perspective. Dr. Ash argues, in other words, that the effortful seeing of these figures, first in one perspective, then in another, involves a process of central control or direction of the exercise of a mental activity analogous to the control of a voluntary movement physically. The results obtained from this experiment seem to the reviewer almost too good to be true; they indicate that, once practise has been discounted or eliminated, the rate of reversal of perspective affords a very quick and reliable index of mental efficiency.

The absolute rate of reversal varies decidedly with different individuals, but for each individual the rate appears to vary in close correspondence with mental condition. The author presents numerous tables which show the measurement of rate of reversal at different hours of the day, before and after periods of mental activity of various sorts and durations, including measurements of the rate of recovery from such mental activities.

It goes without saying that Dr. Ash's results should be subjected to trial by other experimenters and upon children as well as adults and perhaps by various modifications of technique before they are taken as conclusively demonstrated. However, the monograph is, in our judgment, a suggestive and interesting contribution, and none the less pleasing because it has been presented in a clear and concise literary style.

G. M. W.

ELNORA WHITMAN CURTIS. *The Dramatic Instinct in Education*. Boston: Houghton Mifflin Company, 1914. Pp. 246. \$1 net.

A brief review can give no adequate impression of the interest and value of Dr. Curtis' work. In the opening chapters there is a wealth of data on the present condition of children's theaters in this country and Europe, and on the effects which they have on education. America is shown to be far ahead of Germany in the dramatic training of the child as a part of his education. Participation as a child in a well-directed play is shown not only to impress the lesson of the play, but to render the individual more capable of appreciating acting. If the reflex imitation theory of art appreciation is true, such participation would seem to be necessary. Instead of inducing children to elect a stage career, the children's theater has the effect of disillusioning them.

One reads the chapters on dancing, moving pictures, marionettes, pageantry, etc., with a feeling that the discussions are sane and well-balanced. In no sense is the treatment pedantic; instead, there is a crispness and novelty on every page that is wholly refreshing and satisfying. Even the chapters on play and story-telling transcend the usual treatment of these topics, in that they are written from the standpoint of the dramatic tendencies of the child.

The chief criticism to be brought against the book is that the author apparently assumes in both title and discussion that there is in the original nature of the child something as definite as a dramatic in-

stinct. The need for and the joy derived from dramatic, imitative, creative action is beyond question. To say that there is a dramatic instinct is to assume more than is necessary either to explain the widespread occurrence of such behavior, or to justify the claim that it can be made an effective educational agent. But this assumption does not detract materially from the merits of the work. The book is based upon and made up largely of authenticated facts which the reader may interpret in the light of any theory he chooses. As such, it rises above the work of an enthusiast or a propagandist and shows the marks of a scholar worthy of recognition among scholars.

L. W. SACKETT.

The University of Texas.

PASTOR DR. WITTE. *The Education of Karl Witte, or The Training of the Child*. Edited, with an introduction by H. Addington Bruce. Translated from the German by Leo Wiener. New York: Thomas Y. Crowell Company, 1914. Pp. xl, 312. \$1.50 net.

It is just a century since this book, the buried and resuscitated forerunner of several recent treatises of similar import, was printed and published and—forgotten. We seem to owe its revival to the ingenious and pervasive instinct of Addington Bruce for the discovery of hidden springs of living refreshment; his “hazel twig” and its productions are well known to most present-day readers of the magazines.

It is not very difficult to believe the statement of the editor in his Introduction, that “in its original form it is a book which, to employ the quaint but extremely expressive German phrase, does not allow itself to be read,” but it is none the less of considerable importance in the history of modern pedagogy. The latest of the books treating of intensive education begun at a very early age (Mrs. Stoner’s “Natural Education”) is of the same general nature, and both of these suggest “Emile” and Pestalozzi and Berle and Sidis.

The editorial task must have been a grievous one and worrisome to a degree, for only a fraction of the original thousand pages of matter printed by the fond Pastor Witte of Lochau appears in this volume; but even here it is related, for example, how Karl’s good mother weaned him, and also at least one of his narrow escapes from the grave before nine months old—“for Mrs. P. G. at R. [kind but mis-

guided dietician!]) had fed him with blood sausage while still being nursed."

Another aspect of this descriptive narrative of the precocious education of a child is even more prominent than in most similar American accounts, namely, the great fatherly pride in his offspring's attainments ahead of the conventional time. No small portion of the book is taken up by evidences of his attainments. Most people, according to Pastor Witte's statement, believed that Karl was born with unusual endowments of mind, but his father denied this and early and late assumes, with his wife, most of the credit for the boy's precocious accomplishments in efficiency. This very point, here as in similar books, constitutes the only doubt that appears at all about the pedagogical validity of the methods of intensive education.

The translation is an excellent one (better, perhaps, than some of Professor Wiener's other work), and makes easy reading. The book lacks an index, and this lack the twenty-three chapter headings do not supply.

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EDITORIAL.

Those who gave careful attention to the article on the applications of the Point Scale by Professor Yerkes and Miss Anderson in the

**THE POINT SCALE
IN MENTAL
MEASUREMENT.**

March number of this JOURNAL could not fail to be impressed with the possibilities of the method. While the Point Scale is founded upon the Binet Scale, in that most of the twenty tests are copied or derived from Binet,

the new plan has several distinct advantages over the old and represents a noteworthy advance in mental measurement. In spite of the generally favorable attitude that has been manifested toward the Binet Scale and the principle of age tests which it embodies, every investigator who has used it has criticized either the selection or the location of some of the tests. The method of determining mental age by it is admittedly crude, and the results become increasingly unreliable in the higher years. The Binet Scale is standardized at the start, and any rearrangement of the tests or insertion of new tests involves a complete reorganization. There is no way of ascertaining the relative value of the tests with reference to each other, or of evaluating new tests in terms of old ones. No pro-

vision is made for differences in quality of responses, but the judgments must be made on the all-or-none principle of "passed" or "not-passed."

In the Point Scale a convenient number of representative Binet tests is given to all subjects, and the response to each test is evaluated on the basis of a certain number of "points" out of a total of 100. It is true that the selection of the tests and the initial assignment of points to them is just as arbitrary as anything in the Binet Scale. With extended use, however, it will be possible to obtain not only norms of performance in each test for groups differing in age, sex, race and social status, but also the value of each test with reference to the others, and the number of points each should have of the total 100. The Point Scale, further, allows the use of statistical methods in determining the amount of variation in the responses to each test, and thus furnishes an index of the test's diagnostic value.

With the continued use of the Point Scale and the accumulation of a sufficient amount of data, it will be possible to assign a numerical value to each test as a measure of intelligence, just as Buckingham has determined the value of each word in his spelling scale, and the summation of the points obtained by a given individual would afford a specific numerical indication of his intelligence. Such an absolute scale, once established, could be extended indefinitely, each new test being evaluated in terms of those already used. Tests of any degree of difficulty and of any type of demand upon the individual could be introduced and their value established in comparison with the tests already standardized. To determine the intelligence of a given subject the examiner would select from the list a number of tests that he considered best adapted to the purpose in hand, would ascertain what the subject could do in these tests, would give him a corresponding numerical rating, and would compare the result with various norms previously obtained. Such a program may appear somewhat Utopian at present, but the vista of cumulative investigation opened up by the Point Scale is one of its most attractive features.

J. C. B.

NOTES AND NEWS.

It is interesting to note that colleges and universities are beginning to take the work of teaching seriously, and are endeavoring to grapple with some of the problems involved. New York University, for example, announces a series of four conferences on the pedagogy of higher education, in which the deans and professors of all divisions of the university are invited to participate. The topic for consideration at the final conference is "The value of method in college instruction and the pedagogical preparation of college instructors."

At the University of North Carolina the School of Education has been authorized by the faculty to confer the degree of bachelor of arts in education. Characteristic features of the course of study are the beginning of work in education in the freshman year and its continuance throughout the four years of the course in an increasing amount, and emphasis upon educational psychology, rural administration and supervision, high-school organization and teaching, and the observation and practice of teaching. The new course is established in recognition of the need of a more thorough and scientific training for prospective teachers.

The board of regents of the University of Michigan will ask the present Legislature for an appropriation of \$750,000 with which to make additions to the library building and to erect a model training school for teachers. This school, if provided, will be administered by the department of education in the interests of the professional training of teachers. School superintendents throughout the State have long been advocating the need of such a school. They have contended that the graduates of the university who take up the profession of teaching are at present seriously handicapped by their lack of technical training as teachers. The movement in favor of this school has been fostered by the State Board of Education and the normal schools, as well as by the administrative officers of the high schools throughout the State.—*School and Society*.

Professor Lewis M. Terman of Stanford University is preparing a revision of the Binet-Simon Measuring Scale of Intelligence and a detailed guide for its use. The guide is based upon the examination of over two thousand children, and will be issued some time this summer.

Webster's New International Dictionary, published by G. & C. Merriam Company, Springfield, Mass., has been officially adopted or approved by all the States that take official action regarding dictionaries. Such action has been taken by thirty States, the District of Columbia, Alaska and the Philippine Islands. The American Book Company, by special arrangement with the Merriam Company, is issuing a series of shorter school dictionaries based on the New International for use in high and elementary schools.

The trustees of Teachers College, Columbia University, have appointed Prof. Paul Monroe as director of the School of Education and Prof. M. A. Bigelow as director of the School of Practical Arts.—*School and Society*.

Dean Herman Schneider of the University of Cincinnati and Superintendent William Wirt of Gary, Ind., have each received \$10,000 from New York city for ten weeks' work in supervising the establishment of a system of co-operative vocational education in the public schools.

Dr. Walter Van Dyke Bingham, assistant professor of psychology and education at Dartmouth College, has accepted the position of professor of psychology and director of the Bureau of Mental Tests at the Carnegie Institute of Technology, Pittsburgh. The new bureau will co-operate with other agencies in controlling admissions, in advising students about their work, and in recommending students and graduates for positions.

Dr. J. Carleton Bell of the University of Texas will be a member of the faculty of the Summer School of the South, University of Tennessee, at Knoxville, this summer. He will give courses on "Child Behavior, with Especial Reference to the Kindergarten and the Elementary School," and on "High School Behavior," and will

conduct a series of round-table conferences for superintendents and principals on "The Practical Bearings of Experimental Studies in Education." Other members of the faculty from abroad will include Prof. Henry Suzzallo, Teachers College, Columbia University, and Dr. Albert E. Winship of Boston.

At Teachers College, Columbia University, Assistant Professors William H. Kilpatrick and Milo B. Hillegas have been advanced to the rank of associate professor, Dr. Thomas H. Briggs has been appointed associate professor of education, and Professors E. L. Thorndike, Charles H. Farnsworth and Frank M. McMurry have been granted leaves of absence for the year 1915-16.

Dr. Charles A. McMurry, director of the training department, Northern Illinois State Normal School, and superintendent of schools, De Kalb, Ill., has been elected professor of elementary education at George Peabody College for Teachers, Nashville.

Dr. James L. McConaughy, professor of education, Bowdoin College, has been appointed professor of secondary education and executive secretary of the committee on admissions at Dartmouth College. Dartmouth has withdrawn from the New England college entrance examination board, and will endeavor to establish a better understanding between the schools and the college than now prevails.

PUBLICATIONS RECEIVED.

(Notice in this section does not preclude a more extended review.)

LEONARD P. AYRES. *A Scale for Measuring Quality of Handwriting of Adults*. New York: Russell Sage Foundation, 1915. Pp. 11.

This is an extension of the author's scale for measuring the quality of handwriting of school children, and was constructed at the request of the New York Civil Service Commission. Two thousand eight hundred and seventeen samples of adult handwriting were secured from various commercial schools, from the files of the Civil Service Commission, and from correspondence to the newspapers. Each of these samples was rated by ten judges on the basis of the earlier scale, and 24 samples were selected in such a way that there were eight groups of three samples each. Each group contains a sample of vertical writing, medium slant and extreme slant, all three having the same average rating in quality. In the use of the scale the author recommends that the samples to be rated should first be sorted into piles of about the same quality. The papers in each pile are then carefully compared with the scale and with the other papers in that pile to make sure that samples have not been included in the pile that might be assigned to the next higher or lower piles. The scale will be a valuable supplement to the author's scale for children's handwriting.

AUGUSTA F. BRONNER. *The Comparative Study of the Intelligence of Delinquent Girls*. Columbia University Contributions to Education, No. 68. New York: Teachers' College, Columbia University, 1914. Pp. 95. \$1.00.

The problem of this study was to determine the intellectual status of a group of delinquent girls as compared with the intellectual status of several other groups that represent varying degrees of education and that are engaged in various occupations requiring varying degrees of intelligence and ability. Four groups were tested: group one consisted of thirty girls between sixteen and twenty-two years of age in the detention home maintained by the New York Probation Association; second, the college group; third, the evening class group; and fourth, the domestic service group. The tests employed were easy opposites, hard opposites, memory of words, memory of passages and the Ebbinghaus completion tests. In addition the Fernald ethical discrimination tests and several ethical completion tests were used. The results of the investigation quite negative the view that delinquency in behavior is the outcome of mental deficiencies.

J. C. BROWN. *Curricula in Mathematics*. Bulletin No. 619, Washington: Bureau of Education, 1915. Pp. 91.

This monograph surveys the courses in mathematics offered in the different countries represented in the International Commission on the Teaching of Mathematics. The author first presents the general arrangement of the courses in typical schools of the different countries. The work in mathematics is then taken up by school years from the first to the thirteenth. There follow a graphic representa-

tion of the work in mathematics in these countries, a comparison with that done in the United States, and a selected bibliography.

Care of the Health of Boys in Girard College, Philadelphia, Pa. Bulletin No. 614, Washington: Bureau of Education, 1914. Pp. 20.

Perhaps the most striking thing about this monograph is the description of the work of the dental department, showing the individual record cards of pupils treated, and eighteen plates illustrating types of dental defect.

J. CROSBY CHAPMAN. *Individual Differences in Ability and Improvement, and Their Correlations.* Columbia University Contributions to Education, No. 63. New York: Teachers College, Columbia University, 1914. Pp. 45. 75c.

The fundamental problem in this investigation is whether there is any such thing in mental achievement as general improvability. Will the individual who gains rapidly in one measured trait gain with corresponding rapidity in all similar traits? The author analyzes the composite practice curves, and computes the correlation between initial abilities in various functions; between initial and final abilities in these functions; between improvability in one function and improvability in others; between initial ability and improvability in each function; and between efficiency and accuracy in each function. The subjects were twenty-two students, and the tests included color naming, cancellation, hard opposites, addition, and mental multiplication. The author finds a small but constant correlation between initial abilities, and a very slight inter-correlation between improvements.

MARIA B. CHANCE. *Self-Training for Mothers.* Philadelphia: J. B. Lippincott Company, 1914. Pp. 278. \$1.25.

A series of simple, homely talks on such subjects as the mother's duty to herself, health, nursery days, child discipline, responsibility, school days, children's amusements, children's books, the home and the child, and when the children marry. There are many interesting and pertinent anecdotes, and the book contains much sound common sense. There is little or no evidence of a psychological background.

JOHN M. COULTER. *The Fundamentals of Plant Breeding.* New York: D. Appleton & Co., 1914. Pp. xiv, 347. \$1.50.

The practical aim of this book is to increase the food production of the United States, and in order to do that the author deems a much more extensive knowledge of plant breeding essential. We are only at the threshold of the possibilities which may be realized by the application of the principles of scientific agriculture. The work deals with variation in plants, the theories of natural selection and mutation, Mendel's Law, recent work in genetics, the role of hybrids, the production of drought and disease resisting varieties, the search for new plants, and the activities of the federal government in developing agriculture. The book is addressed to those who

wish a simple statement of evolution and heredity, information concerning recent developments in plant breeding, and a general introduction to the fundamental principles underlying agriculture. It should be in the laboratory of every rural agricultural high school and of every teacher who comes in contact with agricultural interests.

PERCY E. DAVIDSON. *The Recapitulation Theory and Human Infancy*. Columbia University Contributions to Education, No. 65. New York: Teachers' College, Columbia University, 1914. Pp. 105. \$1.00.

Chapter two gives an excellent history of the recapitulation theory in biology. The author concludes from this survey that there is very little ground for the acceptance of recapitulation in biology in any other sense than as a practical synonym for heredity. A careful examination of the application of the theory to human infancy reinforces the author's distinctly skeptical attitude toward the whole question of recapitulation in genetic psychology.

The Fourteenth Year Book of the National Society for the Study of Education. Part One. Minimum Essentials in Elementary School Subjects. Standards and Current Practices. Chicago: University of Chicago Press, 1915. Pp. 162. 75c.

The year book contains the following papers: "The Minimum Essentials in Elementary School Subjects," H. B. Wilson; "Time Distribution by Subjects and Grades in Representative Cities," Henry W. Holmes; "Typical Experiments for Economizing Time in Elementary Schools," Frank E. Thompson; "Standard Vocabulary," Robinson G. Jones; "Standards in Rates of Reading," S. A. Courtis; "Selected Bibliography Upon Practical Tests of Reading Ability," William S. Gray; "Handwriting," Frank N. Freeman; "Spelling," Hugh Clark Pryor; "The Essentials of Composition and Grammar," James F. Hosic; "Current Practices and Standards in Arithmetic," Walter A. Jessup; "The Determination of Minimum Essentials in Elementary Geography and History," W. C. Bagley; "The Essentials of Literature," James F. Hosic.

The General Education Board—An Account of Its Activities, 1902-1914. New York: General Education Board, 1915. Pp. xv, 240.

This volume gives the first extended account of the activities of the General Education Board since its establishment. No report has been issued heretofore, because it was felt that the Board's work was experimental in character and that premature statements in regard to its efforts were to be avoided. The plan is, henceforth, to have reports of its work issued annually. There is an account of the history of the Board, its resources and expenditures, the boys' and girls' clubs it has fostered, its activities in behalf of secondary education, particularly in the South; its relation to colleges and universities; and its work in the interests of medical education, rural education and negro education.

LETA STETTER HOLLINGWORTH. *Functional Periodicity. An Experimental Study of the Mental and Motor Abilities of Women During Menstruation.* Columbia University Contributions to Education, No. 69. New York: Teachers College, Columbia University, 1914. Pp. viii, 101. \$1.50.

Eight subjects—six women and two men—were given long series of daily trials with the tapping test, steadiness test, color naming and opposites test. The object of including the two men in the tests was to obtain control records for the interpretation of the results with the women. The conclusions after careful and exact analysis fail to show any mental or motor inefficiency in normal women during the menstruation period. The variability of performance is not affected by physiological periodicity. No regularly recurring period of maximum efficiency in each month is discernible. The results furnish no support for the statements frequently made by psychiatrists and others, and generally accepted by the public, that the menstrual period is a time of profound mental and physical disturbance. The author is inclined to think that these statements belong in the realm of pure myth.

FRANKLIN WINSLOW JOHNSON. *The Problems of Boyhood.* Chicago: The University of Chicago Press, 1914. Pp. xxv, 130.

A course in ethics for boys of high school age. The author recognizes the difficulty the Sunday-school has in retaining its hold upon the growing boy, and believes that the public high school should do something in the way of formal instruction for meeting the needs of the boy's moral development. He holds that, if approached in the proper spirit, boys are thoroughgoing idealists and will welcome a systematic statement and discussion of the foundations of moral action. Some of the topics treated are custom, habit, honesty, property rights, gambling and betting, slang and profanity, clean thinking and speaking, the problem of sex, alcohol and tobacco, self-control and loyalty, citizenship, clubs and fraternities. In connection with each chapter there is a series of topics for class discussion.

Journal of Proceedings and Addresses of the Fifty-second Annual Meeting of the National Education Association at St. Paul, Minn., July 4-11, 1914. Ann Arbor, Mich.: Published by the Association, 1914. Pp. xii, 928.

This thick volume presents the problems and views of the common school superintendent, principal and teacher throughout the United States. It contains several papers of high value in the midst of much that is ephemeral. Papers of especial worth are the discussion between Prof. W. C. Bagley and Dr. David Snedden on "The Distinctions Between Liberal and Vocational Education"; Prof. E. L. Thorndike on "The Foundations of Educational Achievement"; Prof. Walter A. Jessup on "The Economy of Time in Arithmetic"; a symposium on "The Individual Child and His Individual Needs"; a paper

by S. S. Colvin on "The Attitude of the Child in Learning," and one by Clara Schmidt on "Reading and Arithmetic as Tests of Mental Ability."

FREDERICK JAMES KELLY. *Teachers' Marks—Their Variability and Standardization*. Columbia University Contributions to Education, No. 66. New York: Teachers College, Columbia University, 1914. Pp. 139. \$1.50.

The author recognizes two problems in the assigning of marks—first, that concerning the average standard of achievement which should be expected of normal children of a given age and grade, and second, the distribution of ability within the normal group around that standard. The present monograph is concerned chiefly with the first of these problems. After a detailed survey of the literature on standards of marking in elementary schools, high schools and colleges, the author presents the results of a comparison of the marks given by teachers in New York State and the ratings of the same pupils in the Regents' Examinations. He then considers data derived from the application of the Courtis tests in arithmetic, the Thorndike Drawing Scale, the Thorndike Handwriting Scale, and the Hillegas Composition Scale. The author concludes that a given grade or mark means many widely different things to different teachers. In high schools and colleges the percentage of pupils which the various instructors fail varies from 0 to 28. He considers the effort of Courtis to standardize the ability to do single combinations in arithmetic as bad educational policy. The rating of papers by means of statistically derived scales, when the judges are unpractised in the use of the scales but are experienced in marking by the common methods, produces different results for different school subjects. In drawing the variability is greatly reduced by the use of the scale. In handwriting the variability is about equal with or without the scale. In composition the variability is somewhat greater with the scale than without it.

GEORGE TRUMBULL LADD. *What Ought I to Do? An Inquiry Into the Nature and Kinds of Virtue, and Into the Sanctions, Aims and Values of the Moral Life*. New York: Longmans, Green & Co., 1915. Pp. viii, 311. \$1.50.

In this interesting book on the nature and sanctions of moral life the author throughout emphasizes the concept of evolution or development. The treatise is partly historical and partly practical, and is couched in such terms as to appeal to the person of average intelligence and education. There is first an inquiry into the origin of the conviction "I ought," and a discussion of one's intention of "being good" and of "doing the right thing." But "I ought" implies further "I can," and leads to the discussion of moral freedom. Other topics are the worth of moral ideals, virtues, custom and the moral law, questions of conscience, and the relation between morality and religion.

Latin and Greek in Education. Articles by Members of the University of Colorado Faculty. Boulder, Colo., Sept., 1914. Pp. 37.

This symposium on the value of Latin and Greek includes essays from representatives of psychology, chemistry, English, civil engineering, law, philosophy, biology, and medicine. Naturally only those opinions are included which favor the study of the classics. The chief arguments are their disciplinary value in training memory and the reasoning power, and secondly, the cultural value of acquaintance with classical ideals.

ARTHUR LEFEVRE. *The Organization and Administration of a State's Institutions of Higher Education.* Austin, Texas: Organization for the Enlargement by the State of Texas of Its Institutions of Higher Education, 1914. Pp. iv, 524.

This is an interesting, albeit curious, piece of work. The author is a trenchant writer and an industrious accumulator of data, but it would be difficult to find a work which contains so many fallacious or doubtful conclusions between its covers. Part one deals with the relations of the various State institutions of higher education to each other, opposes the idea of a central board of control, and urges correlation of the normal schools with colleges. The author advocates the support of higher institutions of learning by a definite tax. Part two, discussing internal organization, contains many references to the administration of other institutions, and sets forth the author's ideas as to the functions of the governing board, business management, the president, the faculty, the administration of the curriculum, and the activities of the students. The student of administration will find the book stimulating even if it is not reliable.

GERHARD R. LOMER AND MARGARET ASHMUN. *The Study and Practice of Writing English.* Boston: Houghton-Mifflin Company, 1914. Pp. v, 342. \$1.10.

This is a simple manual for use in the upper elementary and early secondary grades. The chapter on established usages contains a discussion of punctuation, capitals, italics, syllabication, rules for plurals, possessives, and spelling. There is a chapter on the essentials of grammar and another on the use of language, a discussion of theme writing, an exposition of the forms of discourse, and a final chapter on correspondence. A valuable feature of the book is found in the extended bibliographical references at the close of each section and at the end.

ARTHUR LOVELL. *New Light on Consumption.* London: J. W. Williams, 1913. Pp. 140.

The author holds up to ridicule the futile attempts that have been made to cure consumption by the use of sera, tuberculin or other medical treatment. Imbedded in much bombastic and mysterious nonsense is the admirable suggestion of providing systematic instruction in how to breathe. In this the author goes one step farther than

the present-day advocate of the fresh air cure for consumption, for, as he forcibly points out, of what good is any amount of fresh air if it fails to come in contact with the surface of the lungs? The real importance of teaching people how to breathe is as yet only faintly appreciated by hygienists and educators.

ROBERT M. MACDOUGALL. *The Picture and the Text*. Reprinted from *Popular Science Monthly*, September, 1914. Pp. 270-283.

The author discusses the reasons for and the results of the increase in the proportion of illustrations to text in recent years. While he recognizes that illustrations have a legitimate place, he believes that the present over-emphasis on illustrations in books, magazines and public lectures fosters an attitude of mental laziness which has a demoralizing effect on our thinking. While this may be defended in literature and lectures designed for entertainment, the author protests vigorously against the abuse of illustrations and demonstrations in instruction. Particularly in scientific lectures is there danger of our deluding ourselves with the fond belief that we are mastering the principles of science in witnessing a moving picture show depicting the marvels of science or entertaining demonstrations of striking scientific experiments. The function of science is to explain, and explanations are logical rather than pictorial and require reflection rather than perception.

Mechanics of the Sewing Machine. Published by the Singer Sewing Machine Company, New York, 1914. Pp. 80. Issued in Co-operation with the Joint Committee on Physics of the National Education Association.

The monographs of this series are designed to enable high school teachers of physics to familiarize their pupils with the physical properties involved in modern machines. The booklet gives a detailed account of the history, construction and underlying principles of the Singer sewing machine.

A. C. MONAHAN. *The Consolidation of Rural Schools, and Transportation at Public Expense*. Bulletin No. 604. Washington: Bureau of Education, 1914. Pp. 104.

The author presents a history of the consolidation movement, a digest of state legislation on the subject, typical transportation arrangements with their cost, the cost of the consolidated school, its educational advantages, and various types of consolidated schools in different communities. There is an excellent working bibliography on the subject of consolidation.

ELSIE CLEWS PARSONS. *Fear and Conventionality*. New York: G. P. Putnam's Sons, 1914. Pp. xviii, 239. \$1.50.

"Fear of change is a part of the state of fear man has ever lived in, but out of which he began some time ago to escape. Civilization might be defined, indeed, as the steps in his escape. What he now calls conventionality is a part of his system of protection against

change which he has begun to examine and, his fear lessening, even to forego." The author considers in detail many of the conventions of our modern life, and traces them back to the fears of primitive man. Instances of these are the rights of hospitality, introductions, castes, presents, calling, entertaining, conventions as to the relations between the sexes, family conventions, age classes, and a final chapter on an unconventional society. The book is full of thought-provoking material for the psychologist who is interested in the development of social customs.

SARA LOUISA OBERHOLTZER. *School Savings Banks*. Bulletin No. 620. Washington: Bureau of Education, 1914. Pp. 34.

An account of the origin and growth of the school savings banks movement and the methods of conducting the banks in different parts of the country.

Report of the Committee on the Academic Status of Psychology. American Psychological Association, Dec., 1914. Pp. 27.

The report includes data from 165 institutions collected from catalogues, and verified by letter to the responsible head in psychology at each institution. In 1894 there were 27 laboratories in the United States and Canada; in 1914 there were 88 such laboratories. There has been an increase in the value of the equipment from \$30,000 to \$163,000. The report gives a detailed account of the relation of psychology to other departments, especially philosophy and education; a study of the beginning course in psychology; a brief account of the advanced courses; a description of laboratory resources, and a discussion of the psychological program as a whole. The report is an interesting contribution to our knowledge of the present status of psychology.

WALTER HERBERT SMALL. *Early New England Schools*. Boston: Ginn & Co., 1914. Pp. ix, 401.

The object of this book is to furnish the material from which the reader may form his own conclusions regarding early New England schools. It is not history, but rather the materials from which history is written. It is to be regretted that the author did not live to see this labor of love, prosecuted for many years, appear in print. The book will be indispensable to all future historians on American education.

JOHN ELBERT STOUT. *The High School—Its Function, Organization and Administration*. New York: D. C. Heath & Co., 1914. Pp. xxiii, 322.

The author believes that with the recent remarkable growth of high schools, and the increasing confidence of the people in them, there is a need for the reorganization of the traditional curriculum and traditional methods of presenting subjects. This book is an attempt to state the principles that should guide us in the process of reorganization. Part one treats of the function of the high school.

including the factors which determine its function, the physical aspects of education, demands for vocational training and guidance, preparation for leisure, institutional and other types of social efficiency, preparation for college, and the education of girls. Part two treats of the organization and administration of the high school, taking up first the intellectual organization. Here the author urges the reorganization of the curriculum from a social standpoint. The center of this curriculum should be the social studies, and grouped around these should come the material sciences, the mother tongue, foreign languages, the ordinary vocational subjects, artistic and ethical education, and physical training. In the second section of part two the author lays emphasis on the need for social organization of the curriculum and the school, and discusses high school government, the material equipment of the school, and the preparation, aims and activities of teachers. The author has some interesting and pertinent remarks on the significance of the study of psychology in the training of teachers. He rightly emphasizes the necessity for the elimination of much of the psychology that is presented to prospective teachers, and lays stress on the learning and the teaching processes. It is true the author's ideas of the application of psychology to educational method are somewhat vague, but at least he demands that the psychological training should focus upon the needs of the teacher's work.

LEWIS M. TERMAN. *I. Suggestions for Revising, Extending, and Supplementing the Binet Intelligence Test. II. Psychological Principles Underlying the Binet-Simon Scale, and Some Practical Instructions for Its Correct Use. III. The Significance of Intelligence Tests for Mental Hygiene.* Reprinted from the *Journal of Psycho-Asthenics*, Vol. 18, Nos. 1, 2, 3, 1913-14. Pp. 20-33, 93-104, 119-127.

The author discusses the selection of children for the standards, the application of the tests, the question of age grouping, the percentage of correct responses necessary for locating a test, criteria for the elimination and substitution of tests, and the desirable number of tests per age group, and gives suggestions for extending and supplementing the scale. He further points out the limitations of the scale, weighs its reliability, indicates special sources of error, and considers the significance of various grades of mental retardation. Finally he shows that the use of the tests has served to draw attention to the degrees of deficiency in feeble-minded children, the desirability of isolating feeble-minded children from normal children, the tremendous range of individual differences in normal children, the weaknesses of the ordinary scheme of promotion in the grades, the development of differential psychology, the better understanding of the insane and of moral peculiarities and abnormalities, and the great need for specialists in mental development and mental hygiene in the schools.

J. ARTHUR THOMSON. *The Wonder of Life*. New York: Henry Holt & Co., 1914. Pp. xxi, 658. \$3.50.

This is a magnificent popular survey of recent scientific studies in the development of animal life. In the introductory chapter on "The Drama of Life" the author gives a fascinating account of typical incidents in the struggle for existence. Chapter two deals with the haunts of life from the deep sea to the upper air. Chapter three gives an account of the way in which living creatures have utilized every portion of the earth's surface, and every kind of nourishment to contribute to the furtherance of organic existence. The next chapter deals with the modes of life and the types of animal behavior. Naturally, stress is laid upon striking manifestations of behavior, particularly the performances of the higher monkeys and the attainments of the lamented trained horses of Elberfeld. Chapter five, on "the Web of Life," discusses the so-called instincts, particularly those instincts having to do with social relationships as seen in ants, bees, birds and other animals. The cycle of life from birth through infancy to full development, decay and death is traced with illustrative material drawn from all fields of zoology. Finally, the author dwells upon the "Wonder of Life," with emphasis on the peculiar and striking characteristics exhibited by many types of living creatures. The splendid illustrations in color, mounted upon a dark gray background, give a most artistic and pleasing effect.

EDWARD L. THORNDIKE. *Educational Psychology—Briefer Course*. New York: Teachers' College, Columbia University, 1914. Pp. xii, 442. \$2.00.

The present volume is a condensation and simplification for students in colleges and normal schools of the author's three volume work on educational psychology, published with the subheadings: "The Original Nature of Man," "The Psychology of Learning" and "Work and Fatigue and Individual Differences." Part one, dealing with man's original nature, discusses the characteristics of original tendencies, man's equipment of naive responses, the instincts, the capacity to learn, the neural basis of original tendencies and the value and use of these tendencies. Part two, dealing with the psychology of learning, develops the principles of learning from the slow modification of reactions in lower animals to associative learning in man, indicates the function of analysis and selection in learning, discusses the amount, rate, limit, conditions, changes and permanence of improvement, the influence of improvement in one mental function upon the efficiency of other functions, and outlines the essential aspects of mental fatigue. Part three deals with individual differences and their causes. Among the latter the author considers sex, race, family, maturity and environment, and refers briefly to individual differences in single traits and in combination of traits, such as types of intellect and character.

MAE C. TROVILLION. *Deficient Children*. Herrin, Ill. 1914. Pp. 75.

This is a thesis for the master's degree at the University of Indiana, prepared under the guidance of Prof. E. E. Jones, and de-

scribes the results of applying the Binet-Simon tests to a portion of the 1778 children in the grade schools of Bloomington, Ind. According to the author's results, 5.2 per cent. of these children are feeble-minded (retarded three or more years) and 10.2 per cent. are backward (retarded one or two years). If the experimental work was as inaccurate and "sloppy" as the text in which it is described, it is not worth attention. Thus we read that the first set of the Binet tests was put forth in 1903 and in the *L'Annee Psychologique*; that they have been tested, among others, by Dr. Edward B. Huey; that the author turned cloakrooms into *miniature* clinics; that Terman's conclusions *was* so and so; that M. W. Barr wrote a book entitled *Mental Deficiencies*; that one of the children tested had small, *slanting* eyes, etc.

ALICE SUMNER VARNEY. *Story Plays Old and New*. Book I, 175 pp; Book II, 174 pp.; Book III, 172 pp. Cincinnati: American Book Co., 1915.

These delightfully-constructed dramatic readers will be a great boon to teachers who are endeavoring to put life and force into their teaching of oral reading. Pupils who read these books aloud with animation can scarcely fail to develop a considerable fluency and mastery of details in oral reading.

WILLIAM A. WHITE. *The Unconscious*. Reprinted from the *Psycho-Analytic Review*, Vol. II, No. 1, January, 1914. Pp. 12-28.

The author holds that the unconscious is our historical past and serves as the regulator and balance wheel of our present consciousness. "The unconscious, then, is like the tail of a kite. While it drags down and holds back, it nevertheless steadies its flight, and prevents its being dashed to pieces by a sudden dash downward, and makes it possible for it to reach greater heights." In order to understand and appreciate the significance of the unconscious we must include in our study not only the individual consciousness, but race consciousness with all of the curious modifications of tradition and superstition.

ROBERT M. YERKES AND J. W. BRIDGES. *The Point Scale: A New Method for Measuring Mental Capacity*. Reprinted from the *Boston Medical and Surgical Journal*, Vol. 171, No. 23. December 3, 1914. Pp. 857-866.

The point scale is a development of the device suggested by Dr. E. B. Huey, and represents a decided advance upon the Binet Scale in two respects. First, every test is to be applied to each subject; second, not only does the test call for the judgment "passed" or "failed," but there is a quality estimate of the performance which is indicated by the number of points obtained. The point scale is easily applied, and lends itself to a much more accurate and flexible diagnosis of individual peculiarities than the Binet Scale. A detailed description of the method, with a report of its application to one thousand individuals, is soon to be issued in book form by Warwick & York, Baltimore.

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A STUDY OF ASSOCIATION IN DEFECTIVES.

MARGARET OTIS, PH.D.

The value of association tests to determine mental status has been widely recognized, and a standardized method for the study of associational tendencies has been worked out by Drs. Kent and Rosanoff.¹ They have given a standard of comparison in the frequency tables published at the close of their work.

Dr. H. H. Goddard recognized the value of this method of studying the feeble-minded children at Vineland, and at his suggestion a study of some of the children was started by myself in his laboratory, September, 1912. The Kent-Rosanoff list of 100 words was used, so that a comparison with normal reactions could be made. Interesting results immediately appeared, so that it seemed advisable to continue the work on a larger scale, and the co-operation of Mr. E. A. Doll, the assistant psychologist, was secured. Especially interesting to study was the form of reaction of some of the defectives, who seemed unable to give an associate to the stimulus word unless allowed to use a number of words or even a complete sentence.

The method of procedure was similar to that of Kent and Rosanoff. Each subject was tested individually in a private room away from ordinary disturbance. In a few cases a visitor was present, but this had no apparent effect upon the reactions of the subject. All of the children tested, 130 in number, were given the test by Mr. Doll or myself. Approximately

¹G. H. KENT AND A. J. ROSANOFF. *A Study of Association in Insanity*. Amer. Jour. of Ins., July and Oct., 1910.

FREDERIC C. EASTMAN AND A. J. ROSANOFF. *Association in Feeble-minded and Delinquent Children*. A. J. of Ins., July, 1912.

ISABEL R. ROSANOFF AND A. J. ROSANOFF. *A Study of Association in Children*. Psych. Bul., Jan., 1913.

the same number was tested by each. Discussion as to method and experiment on each other beforehand gave uniformity of technique as far as possible. The child when brought in was put at ease, and instructions were given in the form of explaining a game. Some time was given at the beginning of each test to entertaining the child, and the whole test was conducted in the spirit of fun. "Wouldn't you like to play a game with me? A word game? Something new? I'll show you how. I am going to say a word, and you must then give me a word that my word makes you think of. For instance, if I should say *cat*, you might say *dog*; or if I should say *tree*, you might say *leaves*; if I should say *sky*, you might say *clouds* or *moon*. Now you answer just one word and don't repeat my word, but say your own, the very first word you think of, just as quick as you can." One or two words not in the list were given for training, and then the experiment began. Each word was given separately in the order of its occurrence in the list, clearly and distinctly. The time was taken with a reliable stop-watch and recorded in tenths of seconds. The uniform procedure was to start the watch immediately after the word was pronounced and stop it the instant the subject began to speak. It was found that many children were inclined to repeat the stimulus word before giving the reaction. When this occurred, the subject was cautioned not to repeat, but to give his own word, and that only. If this caution was not regarded after repeated effort, about the 25th word, he was allowed to respond in his natural manner, and note was taken whenever the stimulus word was repeated. In a few cases, if fatigue occurred, the list was finished at a second sitting.

The time was taken in each case, and the study of this time element yields interesting results that need further elaboration than is possible in this paper. It may merely be said that the time is important as a means of diagnosis of the mental status of the child. In general, the defective children are slower in responding than the normal children. There is great irregularity, also, in the time of response. A study of the measures of central tendency, mean median and mode shows that there are definite types in this respect. The characteris-

tic measure of central tendency is the median rather than the mode or the mean, but the discussion of the significance of these types must be deferred. Our study at present is with the words uttered by the child.

The exact words were recorded. If it was found that he was unable to give a single word after repeated instruction to that effect, he was allowed to respond in the manner natural for him, and the response as he gave it was put down. If any response hard to interpret was given, the child was asked what he had in mind, and a note was made of his own interpretation of his reaction.

The tendency to respond with more than one word proved to be interesting to study, for it seemed to be particularly characteristic of some children. This tendency is recognized by Rosanoff,² but was not made an object of inquiry itself. Some may consider that this form of response indicates merely inability to carry out instructions. The objection to this view is that often the same child may give one-word responses for some time and then change to the other form. The instructions are carried out for some time, until a word is given that suggests no single word, but a whole thought. It may be that it is a stage in language development where the sentence is the unit and represents a thought whole. The power to pick out a single word to represent an idea, the power of analysis, comes later, and indicates greater mental ability. For instance, when the word "table" suggests "You eat off a table," and not the mere idea "eat," we get not only the essential idea, but the setting, the thought as it occurs naturally in the child's mind. "Dark" suggests not merely "Night," but "When the moon shines at night." These responses are logical, and show that true association occurs. Indeed, sometimes there is such a wealth of ideas that the child goes on with one thought after another, led by his interest in his own thought. It is this interest in the thought itself that absorbs the attention; and thus, though the instructions may be at first understood and regarded, they are easily forgotten when the attention is absorbed by some interesting idea.

²I. R. ROSANOFF AND A. J. ROSANOFF. *A Study of Association in Children*. p. 44.

Certain other definite types of responses appeared characteristic of children of differing mental ability. When defectives of lower mental age were given this test, it was found that some could not give an associate word at all, but merely repeated the stimulus word. The instructions were given as to all the other children, and the same incentive to play the game, but nothing could be drawn from them but mere repetition. This would seem to be the natural characteristic of children at the language-learning period when the tendency to imitate is paramount. They have not secured sufficient mastery over language to allow of one idea passing over to another. True association of ideas cannot occur because of paucity of mental furniture.

A stage in advance of this mere repetition of the stimulus word is the giving of a different word, but one without logical connection with the stimulus. The words thus given are often due to distraction, or are associated with the preceding reaction. The result is a list of words, some connected by association with each other, similar to the list of words, 60 in three minutes, asked for in the Binet test XI-3. The stimulus word is understood by the child simply as a signal to give some word, and the determiner for that word may be some object in the room or the child's own mental content. It may be suggested that the words on the list are beyond the comprehension of very young children. This is certainly true of a number of words, and a study of the number of failures of responses at the different ages would reveal this fact. However, there are sufficient words on the list adapted to a child's understanding to make the test fair if a child can use language at all.

Another characteristic mode of response is the tendency to give a word connected by sound with the stimulus word. This has been noted by Kent and Rosanoff,³ and it seems to be more characteristic of the insane type than of the feeble-minded. For example, there occurs the association "mutton"—"button," "hammer"—"slammer," "cottage"—"rottagé."

The object of the present study resolved itself into an examination of these various modes of response in the association test. Can they be used to diagnose different types of

³KENT AND ROSANOFF. *Association in Insanity*, p. 21.

mental weakness? Or do they represent different levels of mental ability and thus may serve as an age test? In the latter case we should find a correlation with the Binet ages of the defectives examined. To make the matter clear, and to make it possible to compare the reactions of the different children, the following classification was adopted:

Types of Response.

I. Repetition of stimulus. If 50 per cent. or more of a given child's reactions are the repetition of the stimulus word, he is considered to belong to this type.

II. Non-logical. This means that words are given at random without connection with the stimulus word.

III. Sound reactions. The reaction word is connected by sound with the stimulus word. It may be either a word or neologism.

IV. Reaction consists of more than one word. This may be a noun with modifier, a phrase or a complete sentence.

V. Reaction one word, normal type. At least 50 per cent. of these reactions must be found in the frequency tables of Kent and Rosanoff.

In every case 50 per cent. of a child's reactions must be clearly of a given type to consider the child as belonging to that type. In some cases when 50 per cent. cannot be found of any definite type, he is considered as belonging to a mixed type. The character of the mixture is taken to be the two types that occur the most frequently in the child's reaction.

Many peculiarities aside from the type of response are to be noted, particularly that the stimulus word is often repeated before the reaction word is given. It is due sometimes to a lack of proper understanding of the stimulus word, and for this reason is sometimes found in responses of normal subjects and of adults. When, however, this occurs repeatedly, notwithstanding instruction to the contrary, it would seem to indicate a lack of some kind. There is a definite tendency to repeat the stimulus word in order more fully to comprehend its meaning. The lips of the subject will often be seen moving, even when the word is not spoken. When the speaking cannot be checked, it indicates a lack of the power of inhibition. In some cases a variant of the stimulus word is given.

Pathological reactions of all the types noted by Rosanoff are found. An interesting case of stereotypy will be given among the illustrative papers. This paper comes under the head of our Type II, for the reactions are given at random and have no connection with the stimulus word. The paper also illustrates how the stimulus word is repeated before the reaction is given. The abbreviation rep. stands for this repetition. The subject given here to illustrate Type I is a boy 11 years of age, testing 6-1; the subject representing Type II is a male 33 years of age, testing 3-4, a Mongolian; Type III is a boy 19 years of age, testing 8-4; Type V is a girl, 21 years of age, testing 8-3. For type IV we have taken a boy of 20 years of age, testing 8-3. Papers illustrative of the different types described are as indicated on opposite page.

Our Type IV, as defined, is characterized merely by the expression of an idea by a number of words, or rather, by more than one word. These more-than-one-word responses are not all of similar character, but may be analyzed and classified. The material at hand shows a great variety of forms of expression, from the simplest indication of the object indicated by the stimulus word, often accompanied by a gesture, to a more complex idea, such as the definition of the object in terms of use. In some cases a mere gesture is all the response that the child will give. Such a form of reaction, reverting to gesture language, cannot, of course, be included in the more-than-one-word responses; but, in considering the modes of response as a whole, should be considered as the forerunner of one of these types. The sub-classes of our Type IV may be arranged as follows:

1. The object indicated by the stimulus word is pointed out. This may be accompanied by a gesture. *E. g. Hand—This is my hand. Chair—There's a chair.* Another form of this class is the use of the stimulus word with the indefinite article. *E. g., Table—a table.*

2. The use of the stimulus word in a sentence, together with pronouns "we," "I" or the indefinite "you," or the word "somebody." *E. g., Eating—We eat. Sickness—We get sick. Cottage—I live in a cottage. Salt—You use salt with your food. Quiet—Somebody is quiet.*

3. A clause giving a general situation, introduced by the

Stimulus.	I.	II.	III.	V.
1. table	table (points)	kissy ⁴ (gesture)	able	fell ⁵
2. dark	very dark	rep. eye	hark	room
3. music	music	rep. teeth	use it	girl
4. sickness	(nods head)	rep. eye	illness	child
5. man	man	rep. chair	maid	hurt
6. deep	deep	rep. eye	sleep	well
7. soft	soft	rep. eye	sore	egg
8. eating	eating	rep. sitting	cheating	girl
9. mountain	mountain	rep. (gesture)	shouting	high
10. house	house	rep. eye	mouse	fire
11. black	black	rep. tooth	rats	rep. wind-mill
12. mutton	mutton	rep. eye	hutton	rep. meat
13. comfort	comfort	rep. eye	no response	house
14. hand	hand	rep. left hand	land	man
15. short	short	rep. eye	loss	rep. lady
16. fruit	fruit	rep. eye	roots	apple
17. butterfly	butterfly	rep. eye	no response	yellow
18. smooth	smooth	rep. monument	moved	road
19. command	command	rep. eye	no response	Lord's
20. chair	chair	rep. bean-bag	rare	hard
21. sweet	sweet	rep. assembly	cheat	rose
22. whistle	whistle	rep. (whistles)	rustle	children
23. woman	woman	rep. eye	homan	fell
24. cold	cold	rep. eye	hold	room
25. slow	slow	rep. city	row	rep. work is slow
26. wish	wish	rep. eye	fish	for
27. river	river	rep. light	fiver	deep
28. white	white	Elsie	kite	dress
29. beautiful	beautiful	rep. boy	no response	picture
30. window	window	rep. wealthy	finger	dirty
31. rough	rough	rep. Riley	roof	boys
32. citizen	citizen	rep. half-penny	no citizen	rep. book
33. foot	foot	rep. belt	rook	sore
34. spider	spider	rep. something	slider	web
35. needle	needle	rep. sew	sleeder	broke
36. red	red	dresses	Fred	rep. paper
37. sleep	sleep	rep. pillowslip	week	woman
38. anger	anger	rep.	no response	rep. temper
39. carpet	carpet	rep. assembly	rocket	red
40. girl	girl	rep. eye	curls	playing
41. high	high	rep. paper	pie	hill
42. working	working	rep. eat	rotten	hard
43. sour	sour	soft	soda	rep. grapes
44. earth	earth	rep. eye	irk	flat
45. trouble	trouble	rep. watch	rubble	people
46. soldier	soldier	rep. assembly	no response	army
47. cabbage	cabbage	rep. eye	kettles	good
48. hard	hard	rep. pie	rad	pavement
49. eagle	eagle	rep. eye	needle	bird
50. stomach	stomach	rep. eye	no response	girl

⁴Probably meant for kitchen.⁵Explanation: "As if it fell on the table."

word "when." *E. g., Whistle—When you whistle. Woman—When she's grown up. Beautiful—When things are beautiful. Citizen—When men get together. Trouble—When people have trouble. Soldier—When a man is a soldier.*

Stimulus.	Type IV.
1. table	I eat off a table.
2. dark	It's dark at night.
3. music	repetition.
4. sickness	no response.
5. man	The man likes to work.
6. deep	rep. The hole is deep in the ground.
7. soft	Snow is soft.
8. eating	I like to eat pie.
9. mountain	I've never seen mountains.
10. house	rep. I like to sleep in a house.
11. black	rep. The coal is black.
12. mutton	rep. Goes into the stuff that you eat.
13. comfort	rep. It's comfort to have heat in the house.
14. hand	rep. Use your hand to pick up things with.
15. short	rep. No.
16. fruit	Fruit grows on the trees.
17. butterfly	Butterflies fly around.
18. smooth	The table is smooth.
19. command	Drill master gives out commands.
20. chair	I like to sit in a chair.
21. sweet	rep. Candy is sweet.
22. whistle	I like to whistle.
23. woman	no response.
24. cold	The ice is cold.
25. slow	no response.
26. wish	I wish Christmas was here.
27. river	The boys like to swim in the river.
28. white	rep. Paper is white.
29. beautiful	Flowers are beautiful.
30. window	Window be's in the frame of a house.
31. rough	rep. Stones are rough.
32. citizen	rep.
33. foot	rep. I like to play foot-ball.
34. spider	rep. Spider crawls around in the house.
35. needle	rep. You can sew with a needle.
36. red	Roses are red.
37. sleep	I like to sleep at night.
38. anger	rep.
39. carpet	Carpet be's on the floor of a house.
40. girl	no response.
41. high	rep. The boiler house chimney is high.
42. working	no response.
43. sour	rep. Lemons are sour.
44. earth	rep. Vegetables grow on the earth.
45. trouble	rep. I have trouble doing things some times.
46. soldier	no response.
47. cabbage	rep. I like to eat cabbage.
48. hard	The ground is hard sometimes to dig.
49. eagle	rep. Eagle flies around.
50. stomach	I have a pain sometimes in my stomach.

4. A definition of the stimulus word, generally in terms of use. *E. g.*, *Chair—What you sit in. Hammer—What you nail things with. Doctor—To make you better. Scissors—What you cut with.*

5. A sentence expressing various logical relations, as genus—species, species—genus, object—verb, verb—object, attribute—substance, substance—attribute, part—whole, etc. *E. g.*, *Cottage—Maxham cottage. Mutton—Mutton is meat. Music—I like music. Wish—Anybody wish for anything. Deep—The well is deep. Ocean—Ocean is big. Stomach—Stomach is part of your body.*

In fact, in watching the children's mode of reaction in this test we can discern all stages in language development from the first effort of merely imitating the sound without understanding the meaning, also gesture language without words, pointing out of object accompanied by gesture, sound reactions, to the higher forms of the expression of the idea by a sentence as a complete thought-whole, and finally to the point where analysis is possible, and a single word can be selected to express the salient idea.

The question arises whether these various peculiarities are indicative of special mental types or are characteristic of special periods of development in all children. Can any one of these types be used as an age test? Or have we here characteristics that may be used to diagnose special peculiarity or abnormality of mental equipment? To help in deciding such questions as these there is needed a standard of comparison. Do we find such peculiarities among all children? To determine this point it was decided to examine in detail the responses of normal school children.

The work of Rosanoff does not help us here, for, though the fact that more-than-one-word replies occurred, they were not recorded or studied according to the age limit. Through the kindness of Dr. J. M. McCallie of Trenton, permission was secured to give the association test to some of the children of the Franklin School. During the winter of 1914, 200 children were examined whose ages were evenly distributed between 4 and 8, 40 in each group. It was thought that the age-limit, if such there was, would probably lie between these points.

The same mode of procedure, in general, was adopted as for the defectives, except that only 50 words were given, for it was almost universally true that the type of response was determined for each individual by the time the fiftieth word was given; and since the immediate object in view was a study of these types, it seemed unnecessary to use the whole list of 100. Co-operation was secured with the psychological laboratory of Princeton University, and through the kindness of Prof. H. C. Warren, Mr. Melville, research assistant, helped in the work of giving the test to the school children. A variation in procedure consisted in taking two children at the same time, giving the first 50 words of the Kent-Rosanoff series to one child and the second 50 to the other. Competition was thus secured, and proved a valuable incentive to prompt replies. It was found that the type of response was not affected by this method; that is, if a child was inclined to reply according to Type IV, he would continue to do so, even though his neighbor was giving replies according to some other type. In short, the types persisted clearly and distinctly, unaffected by the tendency to imitate, if the higher type of response was beyond the children's mental capacity. In a number of cases the same children were examined by Mr. Melville and myself, thus enabling a study of the personal equation. In one case it was found that by special effort of training one subject at the end of a second sitting began to answer according to Type II rather than Type I, but in general the result was not affected by the personality of the examiner.

The responses of the normal children are found to fall into the same general types as those of the defectives. More illustrations of our Type II are found among these children, the other types remaining about the same. A characteristic paper of a girl of four years, showing this type, is the following. The words happen to be the second half of the Kent-Rosanoff list:

51. stem	glasses	77. hammer	hatchet
52. lamp	coat	78. thirsty	hand
53. dream	collar	79. city	ice-cream
54. yellow	chair	80. square	doll baby
55. bread	hat	81. butter	hop
56. justice	calendar	82. doctor	church
57. boy	plate	83. loud	window

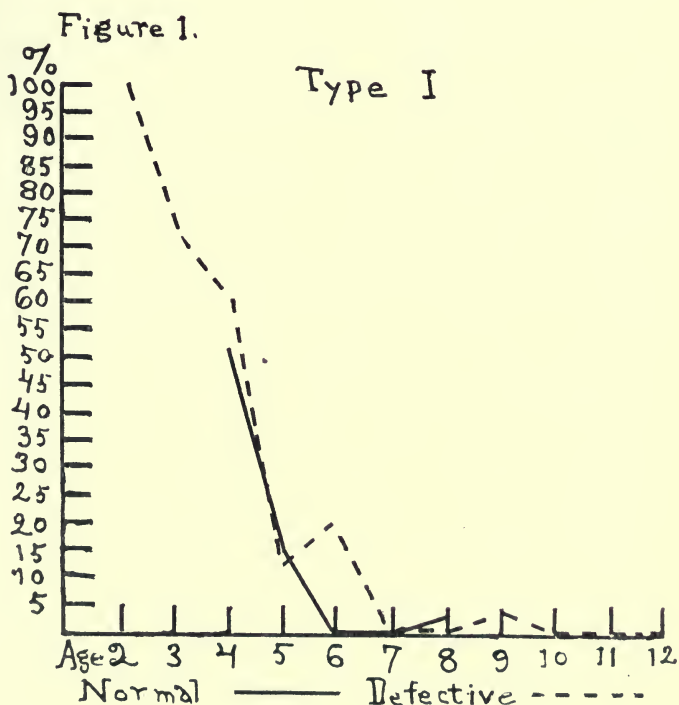
58. light	hair	84. thief	curtain
59. health	bell	85. lion	pencil
60. Bible	church	86. joy	pen
61. memory	shoes	87. bed	chair
62. sheep	umbrella	88. heavy	wear heavy dress
63. bath	drawer	89. tobacco	smoke
64. cottage	sweater	90. baby	put it in a baby-coach
65. swift	chair	91. moon	lady
66. blue	purple	92. scissors	Tuesday
67. hungry	bird	93. quiet	lamp
68. priest	.....	94. green	scissors
69. ocean	kitty-cat	95. salt	spool
70. head	button	96. street	swords
71. stove	pan	97. king	horses
72. long	eyes	98. cheese	wagon
73. religion	.....	99. blossom	hair
74. whiskey	put on heavy hat	100. afraid	knife and fork
75. child	chair		
76. bitter	Santa Claus		

The papers both of the defectives, 132 in number, and of normal children, 202 in number, were analyzed, and the number of words occurring in the frequency tables in each was noted, the number of failures of response, the number of repetitions of stimulus, and the individual reactions. The number of sound reactions, when such occurred, was noted, also the number of non-logical responses, Type II; the number of repetitions of stimulus, Type I, and in a few cases it was found that a special class was needed to provide for papers where the characteristic mode of response was a variant of the stimulus. The type of each child was thus determined. As has been said before, where 50 per cent. of responses could not be found belonging to one type, it was considered a mixture, and the elements composing the mixture were decided to be the two types that occurred the most often.

To compare the results thus obtained from the defectives and the normal children, the defectives were arranged in groups according to their Binet age. These groups then are compared with the groups of the normal children of corresponding chronological age. The following tables show the distribution of types among the ages (mental age for defectives, chronological age for normal children). In the tables the mixed types are indicated by using smaller figures. The groups of normals are more evenly divided than the groups of defectives. The number in each group is given in the right-hand column:

In the above tables F represents a paper where no response was obtained. For the purpose of comparison the mixtures are counted with the type that constitutes its chief component. Thus the lower line of figures shows the number in each type. By computing the percentage of each type for each age we obtain curves that show clearly the results of the investigation. In general, there is a greater amount of inferior types among the defectives than among normals. The curve for Type I is quite similar for defectives and for normals at the ages of 4 and 5. It drops to 0 for normals at 6 years, for defectives at 7 years, and the type occurs sporadically among defectives of an older mentality. For normals the type is common at the age of 4, and occurs at the age of 5 years.

Type II appears as a variation of Type I, and is characteristic especially of normal children of 5 years. This type appears more frequently among the normals than among the defectives; Type I prevails among the defectives at the corresponding age.

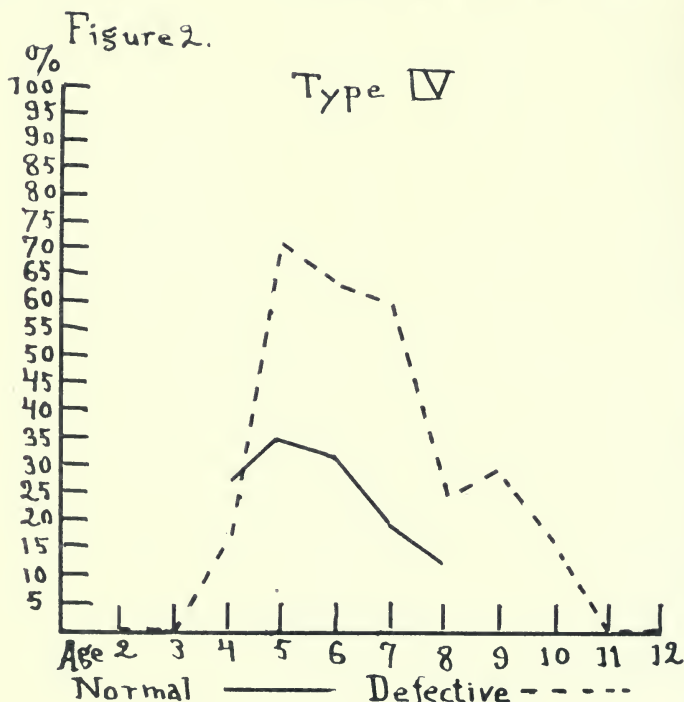


Type III does not appear as a characteristic of any particular age, but appears sporadically at any age. It indicates rather an abnormality of mind than any particular level of development.

Type IV is found more frequently among defectives than among normals. The curve for defectives is higher and descends to 0 at a later age; that is, 11 years. The high points of the curves for normals are at 5 and 6 years; for defectives at 5, 6 and 7 years. That is, the type persists longer for defectives. We may say, then, that this type is characteristic of a mental age of 5 to 6 years, or may be characteristic of mental defect in itself.

The curve for Type V for normals is more regular and is higher at all points than that for defectives. This means that more normal children can use this type at an earlier age than the defectives. The type is established at 8 years for normals, but the upper limit is not reached.

Repetition of stimulus. We have also followed in this study the tendency to repeat the stimulus word, notwithstanding in-



struction to the contrary. This characteristic, when no other reaction follows, constitutes our Type I. But it also occurs before the regular associate word is given. A few cases of such repetition may occur with perfectly normal subjects and among adults, due to the imperfect understanding of the stimulus word, or to lack of attention. When, however, the stimulus word is regularly repeated, or, in a large percentage of cases, it constitutes an earmark of a lowered mental state, or it may be a lack of the power of inhibition, or a defect of some sort.

To study this feature as it occurs in the cases both of defectives and normals examined the following scale is adopted: Ten per cent. or less of cases of repetition of stimulus for any individual constitutes our zero grade, and indicates that this tendency is infrequent, and therefore a negligible quantity. Three degrees of addition to this habit may be distinguished: (1) 11 to 30 per cent. of cases of repetition; (2) 31 to 60 per cent.; (3) 61 to 100 per cent. The following tables show how these grades are distributed among the different ages:

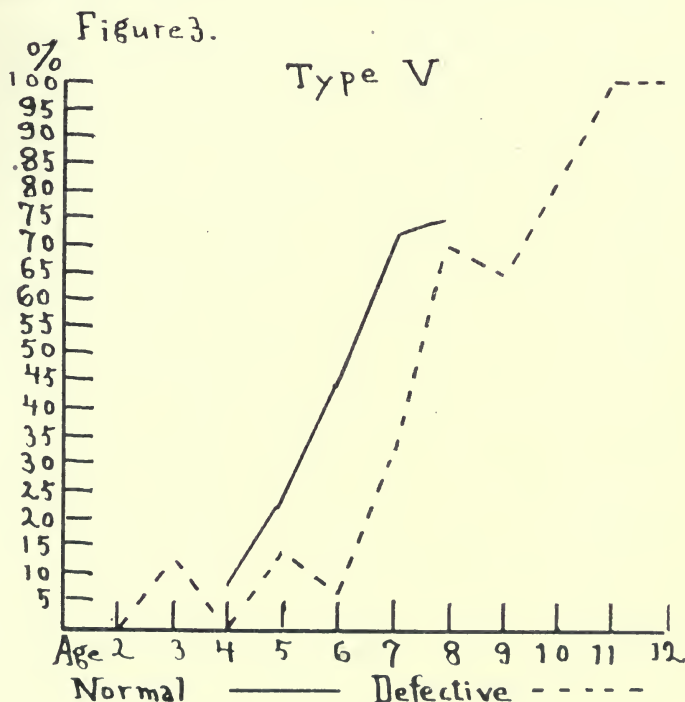


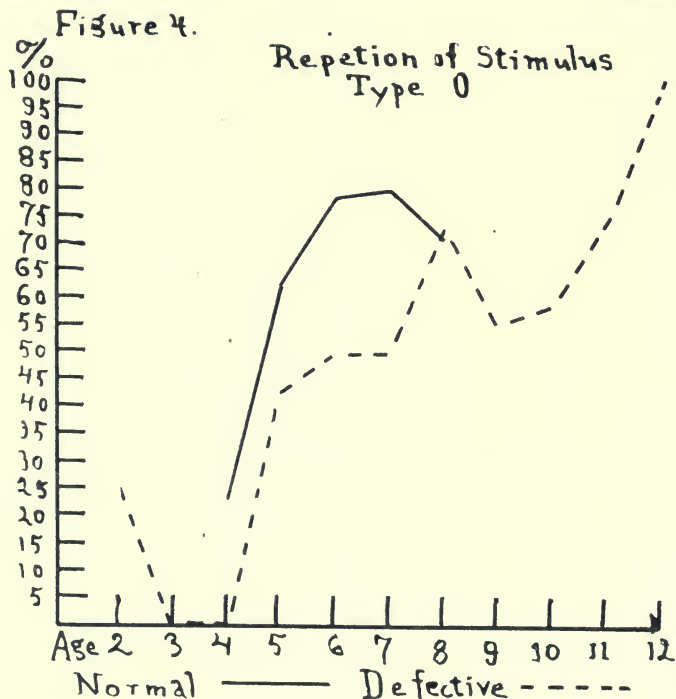
TABLE III.—*Defectives.*

Age.	(0)	(1)	(2)	(3)	
2	1	..	3	..	4
3	..	1	3	3	7
4	..	..	2	2	4
5	3	2	1	1	7
6	8	..	4	4	16
7	9	7	1	1	18
8	20	3	3	1	27
9	13	8	1	1	23
10	10	4	3	..	17
11	3	1	..	..	4
12	4	..	..	..	4
	71	26	21	13	

TABLE IV.—*Normals.*

Age.	(0)	(1)	(2)	(3)	
..	
..	
4	9	5	19	7	40
5	27	3	5	8	43
6	31	4	3	1	39
7	32	5	2	1	40
8	29	9	2	..	40
	123	26	31	17	

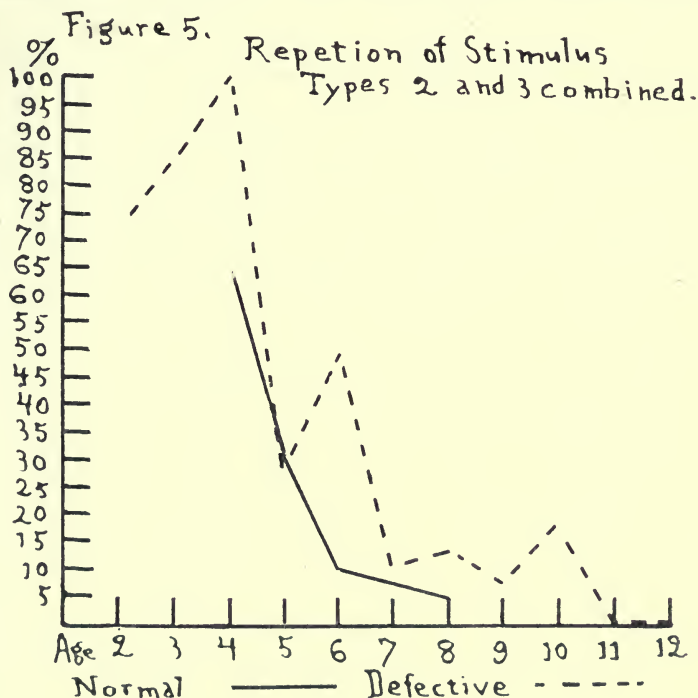
Reducing these figures to percentages and studying the results, we find that freedom from this habit of repetition of stimulus word or the zero type is found more among normals than among defectives. Absolute freedom is reached with defectives at the mental age of 12. The upper limit for normals is not reached at 8. This agrees with Rosanoff's conclusion that the regular technique for the association can be fol-



lowed at about 11 years. The first degree of addiction to the habit of repetition (11-30 per cent.) does not appear to be characteristic of any particular age, but may appear at any age. It disappears with defectives at 12. The second and third degrees (31-60 per cent. and 61-100 per cent.) or an excessive amount of this repetition varies inversely with age, both with normals and with defectives. The third degree disappears with normals at 8, with defectives at 10. The most frequent occurrence of this degree for normals is at the ages 4 and 5; for defectives, at the ages 4, 5 and 6.

The curve of the zero type or freedom from this tendency shows that normals are less addicted to the habit than mental defectives. The curve for Types II and III shows that an excessive amount of repetition of stimulus, over 30 per cent., is less frequent among normals than defectives. The curves in both cases are more irregular for defectives.

Summary: The results agree with Rosanoff's conclusions in general—that the technique for the association test is established at 11 years. The study of the types of response



yields the following: Type I, the lower limit was not found. It is probably three years. The type appears among defectives of higher mental level than among normals. Type II occurs most frequently at 5 years. Type III is sporadic. Type IV is characteristic of children of 5 to 6 years, and is more frequently found among defectives than among normals. The upper limit of Type V is not reached at 8 years. The child of 8, though he responds in the form of Type V, yet from the character of his reactions and from the number of failures of response, cannot be said to respond as a child of 12, or as an adult. In the study of the repetition of the stimulus word, before the reaction we find that this tendency is more common with defectives than with normals, especially at the mental age of 4 to 6.⁶

Frequency tables have been compiled from the responses of the defectives, and also of the normal school children. The tables show a large number of responses not found in the Kent-Rosanoff tables. Yet the response of highest value with the defectives is universally a Kent-Rosanoff response, and in 55 cases out of the 100 it is a highest value Kent-Rosanoff response. These tables are on file at the Vineland laboratory, and may be consulted by those who are interested.

⁶We wish to acknowledge with thanks our indebtedness in preparing this article to Dr. H. H. Goddard for the suggestion of the subject and inspiration in the work; to Mr. E. A. Doll for co-operation and use of material accumulated by him; to Dr. H. C. Warren for encouragement and advice in the arrangement of the material; to Mr. N. Melville for assistance in testing the school children; to Miss Norma Cutts for assistance in compiling the results, and to Dr. J. M. McCallie for permission to give the tests in the Franklin School of Trenton.

FORM AND POSITION IN HANDWRITING INTERPRETATION. PART I.

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Introduction.

1. The Reading of Mirror-Script.
2. The Reading of Illegible Writing.
3. The Pairing of Hands.
4. Speed and Accuracy of Performance.
5. General Conclusions.

SUMMARY.

There exists a relative independence of form and position as spatial elements. Mirror-reading tests ability to handle shifts in position. The rapid reading of samples of illegible writing and the rapid and accurate pairing of handwriting specimens suggest themselves as tests of form-perception. Low coefficients of reliability indicate, however, the need of standardization of such tests. The reading of illegible writing and the pairing of hands fail to correlate.

Correlations with the completion test suggest that the meaning-factor is of more significance in the reading of illegible writing than in the reading of mirror-writing. With the exception of records on one specimen of illegible writing, there is little evidence of correlation of ability to read mirror-script and ability to read illegible writing.

INTRODUCTION.

In another connection¹ an account has been given of certain conditions reported by a young woman (X) who during the first two or three years of her school life wrote spontaneous right-hand mirror-script. X reported facility in work that demanded shifts in the position of a letter, but inadequacy in dealing with shifts in form. Thus, while showing unusual

¹DOWNEY, J. E.. "On the Reading and Writing of Mirror-Script." Psychol. Rev., XXI, pp. 408-441.

expertness in type-setting, she was at a loss in a postoffice. She found great difficulty in deciphering illegible writing, and was unable to recognize familiar hands.

These statements were of particular interest in connection with Stern's conclusion² that form and position as elements of spatial perception are at first disconnected, and that, before their fusion, mirror-writing and mirror-drawing are frequent occurrences. The extraordinary range in variation in the ease with which different individuals are able to read and to write mirror-script suggested, moreover, that possibly even after the period of childhood, individual variations in the closeness of the fusion of form and position occur.

A checking of X's assertion—that she was ready in the interpretation of “dislocated” form, but unskilful in the interpretation of distorted forms—involved extensive testing not only of X, but of a number of other reagents. The use of mirror-reading as a test of the ease with which a subject interprets shifts in relative position of letter-parts seems justifiable. It was thought that ease in reading illegible writing might be employed as a test of the ease with which distorted forms were recognizable. The capacity of rapid matching of pairs of handwriting was also thought of as a possible test of form-perception. Accordingly, a series of tests was planned to determine the correlation between ability to read mirror-script and ability to read illegible writing and to pair handwritings.

The problem as a whole proved, however, to be much more complicated than appeared at first sight. The standardizing of any test (that, for instance, on illegible writing) is a comprehensive piece of work. Our results, consequently, instead of answering definitely the question with which we began the investigation, proved to be of value chiefly with reference to the interesting question of individual variation in the general capacity to interpret handwriting and the general problem of the method to be utilized in such an investigation.

Before attempting to discuss the bearings of the separate tests upon one another we shall describe each test and give the results of each. We shall take up successively: (1) The read-

²*Ueber verlegerte Raumformen*. Zsch. f. ang. Psychol., II (1909), pp. 498-526.

ing of mirror-script; (2) The reading of illegible writing, including in this connection a report upon two completion tests; (3) The matching of handwritings. In section 4 we shall discuss the relation of speed and accuracy of performance. Finally (5) we shall attempt to bring together our results and to draw certain tentative conclusions.

For the detailed tests, the results of which were utilized in getting coefficients of correlation, the same reagents were used, namely, 16 seniors or juniors in the University of Wyoming. These 16 reagents constituted a rather closely selected group of subjects, a number of whom were honor students or students who had shown particular ability along some specific line of work. They came, however, from very different courses, those of liberal arts, agriculture or engineering. Eight were men, eight were women. A few had served previously as reagents in psychological tests; all were well acquainted with the experimenters and at ease with them.³ The selection of such a group of subjects should be noted, as Simpson has shown that a closely selected group reduces the size of the correlation coefficients.⁴ In calculating these coefficients

$$6 \Sigma D^2$$

cients the formula $r=1-\frac{6 \Sigma D^2}{n(n^2-1)}$ was used.

The test on pairing handwritings proved to be of such intrinsic value that many reagents besides the group of 16 mentioned above were tested.

1. THE READING OF MIRROR-SCRIPT.

In the report referred to above an extensive account has been given of the individual variations in the method and rapidity with which mirror-script is read. Evidence was presented that to a certain extent ease in such reading correlates with age. Some other factor determining success or failure was also evident, perhaps a visual as against a motor form of

³We wish to express our thanks to the busy students who so generously assisted us in this work.

⁴SIMPSON, B. R. *Correlations of Mental Abilities*. Col. Univ. Cont. to Edu., No. 53 (1912).

spatial orientation. That a general problem of orientation was involved seemed indicated by the fact that, apparently, ease in mirror-reading correlated in the case of 25 freshmen reagents with the degree of *right-handedness* as shown by the amount of difference in the rapidity of right and left-hand mirror writing.

In the present tests of ability to read mirror-script the first thing sought was a measure of the reliability of the test. Accordingly, two sets of tests were carried out on the 16 reagents.

Method. The subject was given a card on which 12 words had been written in mirror-writing. The words were first written in a wide-spaced, plain, round legible style on thin tissue paper, which was pasted, top side down, on a heavy card. For the first test the words used were these: "Two telephones were placed at two symmetrical points of the same circle." For the second test the words were: "By division he found the average length of 14 large fat men."

The subject was given the card wrong side up and instructed to turn the card over at a signal and begin reading aloud the words written on the opposite side. The experimenter kept with a stop-watch a record of the time needed for reading the sentence. The character of the mirror-writing was explained very briefly as backwards writing that began at the right instead of the left side of the paper. Three of the 16 subjects were tested on the first specimen in the spring of 1913 and the remainder in October, 1913. The entire second series of experiments was run off during March, 1914.

Results. In the first series of tests times ranging from 34 seconds to 7 minutes 54 seconds were obtained, with a range in errors from none to 8 words; in the second series the time varied from 40 seconds to 14 minutes and 46 seconds, with a range in errors from none to 5 words. The last time record represents an extreme that was reached by only one subject, the next highest being 8 minutes 4 seconds. In the first series 8 persons completed the sample without a mistake; in the second series, 11 made no mistakes. It was not found possible to hold every subject to the task until every word was correctly interpreted because of curious setting of errors, on the

one hand, and the loss of confidence and interest, on the other, that resulted from failure to achieve success.

The time and errors were equated by finding the ranking of each student for time and errors separately and obtaining the average. On the basis of this average the subjects were given their final ranking. In making the ranking for errors several methods of estimating them were used with practically the same result: first, the subjects were ranked according to the flat number of errors counted by whole words; secondly, a value was assigned to each error depending upon the frequency with which it occurred, and thirdly, a value was assigned to each error depending upon the number of letters in the word.

The correlations, all positive, are as follows:

On the Time basis.....	r	.490
On the Error basis.....	r	.583
Equated for Time and Error. Word errors counted as wholes.....	r	.697
Equated for Time and Error. Errors valued by frequency.....	r	.687
Equated for Time and Error. Errors valued by length of word.....	r	.700

The correlation between the two series of tests is fairly high, although not as high as anticipated. It is possible that some of the subjects may have practiced mirror-reading in the long period between the two series. We know of three who did so, but only to a slight extent. A slight practice effect was noticeable in the second test, since the subjects, after trying the first test even so long a time before, knew better how to go at the second test. This may account also for the decreased number of errors in the second test.

2. THE READING OF ILLEGIBLE WRITING.

Method. In this test the reagent read aloud from samples of illegible writing. The samples consisted of ordinary business or friendly letters written without the writer's knowing that the letter was to be used for an experiment. They were of the kind written by adults who have done a great deal of writing. They uniformly presented simplified forms, without much ornamentation or superfluity of stroke. No tests with

illiterate or ornamented hands were tried. The specimens, however, were quite distinct as regards individuality.

Three series of experiments were tried, each consisting of two parts. First, the subject was given a connected sample of writing, and secondly, a sample of the same writing that had been mutilated by blotting out key words in such a way that little meaning was left. The two specimens in the first series (A 1 and A 2) each contained 72 words; the two in the second (B 1 and B 2) each 100 words, and the first in the third (C 1) 40 words and the second (C 2) 28 words. Samples A 1, B 1 and C 1 were the unmutilated specimens and A 2, B 2 and C 2 the mutilated specimens.

The subjects were given the sheet of paper face downward and told at a signal to turn over the paper and read aloud what was written upon it. As the reading began the experimenter snapped a stop-watch. For the first and third series oral instructions were used; for the second, written instructions. The written instructions (the oral were practically the same) were as follows: "This is a sample of illegible writing which you are to read as rapidly and accurately as possible. As you will only be allowed to go over the sample once, take care to get every word you can. Do not hesitate too long over any single word, as its significance may come to you as you read further." For the second or mutilated specimen another sentence was added to the instructions, namely, "Pay no heed to the words which are blotted out." The 16 reagents described above took part in this test.

Three of the subjects were tested with samples A 1 and A 2 in April, 1913; the remainder in October, 1913. The test with samples B 1 and B 2 was carried out in March, 1914, and those with C 1 and C 2 later in the same month, with at least an interval of a week between the two tests. The subjects would frequently make comments on the test, which were jotted down. During the course of the experiment the observer made note of anything worthy of comment in the subject's procedure.

Results. The extreme times and numbers of errors in the six tests were as follows:

TABLE I.

Test.	Words.	Time.		Average.	M. V.	Errors.	
		Lowest.	Highest.			Lowest	Highest.
A 1.....	72	50"	360"	146"	73.1"	3	24
A 2.....	72	71"	373"	199"	96.5"	6	24
B 1.....	100	51"	173"	84"	26.9"	0	12
B 2.....	100	67.5"	170"	99"	25.6"	6	19
C 1.....	40	30"	140"	73"	30.8"	4	12
C 2.....	28	28"	110"	61"	21.3"	4	16

If the average time is evaluated in tests A and C on the basis of 100 words, so that it may be compared with that of Test B, we obtain the following result:

TABLE II.

Evaluated Time Average.

A 1.....	202.7"	B 2.....	99"
A 2.....	276.4"	C 1.....	182.5"
B 1.....	84"	C 2.....	217.8"

The correlations between the reading rates for the various samples of illegible writing are as follows:

TABLE III.

	A 1	A 2	B 1	B 2	C 1	C 2
A 1.....	...	.420	.552	.650	.410	.456
A 2.....	.420	...	.297	.479	.156	.126
B 1.....	.552	.297	...	.540	.186	.559
B 2.....	.650	.479	.540	...	.347	.169
C 1.....	.410	.156	.186	.347	...	.465
C 2.....	.456	.126	.559	.169	.465	...

The time and error range as well as the average time (equated) indicates that samples A and C are much more difficult to read than is sample B. The relative retardation in speed when the mutilated samples were read indicates again the comparative ease with which B was read and the difficulty involved in interpreting the letter-forms of A and C. A comparison of samples A and C shows that mutilated A was, relatively, more difficult to interpret than mutilated C. It would seem that one of two things must be true: either

the context of A 1 was more significant than that of C 1, or else the form in C 1 was so distorted as to put the mutilated and un mutilated specimens more nearly on a level than was the case for sample A. The first interpretation seems more justifiable.

Whatever form habituation occurred gave an advantage to the reading of the mutilated samples. In the longer specimens form-habituation might have occurred within a given test and thus increased the speed of reading toward the close.⁵

If we turn now to the correlation coefficients for the reading of the different samples of un mutilated writing (speed and error being put on an equal basis), we find that they are not very high: the highest is the correlation of A 1 and B 1 (.552), next comes that of A 1 and C 1 (.410); the correlation of B 1 and C 1 gave a coefficient too low to be significant.

The mutilated samples were introduced into the test as a means of determining how far context was influential in determining the ease of reading and how far form alone was significant. Again we find the highest correlation for A 2 and B 2 (.479). But mutilated C gives a correlation of only .126 with mutilated A 2. B 2 and C 2 give a correlation of only .169.

The highest correlation between reading the mutilated and the un mutilated for the same sample occurs for sample B (.54). This, of course, is what we should expect, since B is the least difficult hand to read. The correlation of A and C, mutilated and un mutilated, is, respectively, .42 and .465. In spite of the cutting out of key words, there is a considerable amount of agreement in the ease with which two samples of any particular writing can be read.

⁵In order to determine the effect of habituation to the form of the writing, the time record for the un mutilated specimen was subtracted from the time record for the mutilated specimen in tests A and B. In test C, since the number of words in the two samples differed, the times were equated and the differences then obtained. On the basis of the differences obtained, the subjects were ranked for each of the three tests, the subject showing the greatest minus difference in speed between the mutilated and the un mutilated being given rank 1, and the greatest plus difference, rank 16. Coefficients of correlation between the tests were obtained, with the following result: A and B, —.061; A and C, —.092, and B and C, —.444. From these correlations no conclusion regarding form habituation can be drawn. There was no uniformity in the behavior of individual subjects. For instance, a subject who ranked 1 in A, 2 in C, ranked 16 in B.

Some high correlations occur between the mutilated of one sample and the un mutilated of another. Thus, A 1 and B 2 give a coefficient of .65. A 2 and B 1 give a coefficient of only .297. A 2 and C 1 give only .156; C 2 and A 1, .456; B 2 and C 1, .347; C 2 and B 1, .559.

Later we shall discuss the bearing of meaning upon the reading of the samples; at this point we conclude that the need of better standardization in the tests is evident. It would no doubt have been more satisfactory as a test of form-recognition to have presented the letters singly or in small groups, as Starch did in measuring writing legibility. Yet Starch found the correlation between legibility in words and letters very high.⁶ The specimens of writing should have been of the same length, and this length should have been estimated in terms of letters, not words.

Individual Reactions. With regard to individuals, we find that there is great variation in procedure and ease of handling the complex situation presented by reading a sample of illegible writing. There are some subjects for whom the words as they stand are significant, dependence being placed exclusively on neither meaning or form, but on a combination of both as occurs in ordinary reading. The forms are reasonably legible to the subject; he reads the writing much as he would ordinary print, getting the meaning as he goes.

A second class of subjects is composed of those who depend to a large extent upon meaning. These subjects read the specimens without paying close attention to form. As is true with the first class, many words are legible as they stand, but when a break comes, the subject makes a substitution, largely upon a meaning basis, of a word that is somewhat similar to the correct word in form. This class of subjects does not notice the difference between the substituted form and the actual form that appears upon the paper. Some of them obtain an entirely different meaning from what is intended in the writing. For instance, in Test C 1 a subject read "latest

⁶"The table shows that the legibility of letters is practically identical in relative order with the legibility of words in their context. The coefficient of correlation of the two series of measurements is + .90." STARCH, D. *Measurements of Handwriting*. Jour. Edu. Psychol., Vol. IV, p. 449.

list of all" as "taxes this year," words that make some meaning, but are only slightly suggested by the form.

The third class of subjects includes those who place great dependence upon form, but pay little attention to meaning. The illegible form suggests some word or group of words quite different from what was intended, words which mean nothing at all when taken in connection with the rest of the sentence. Such a substitution occurred in Test A 1, where one subject read "Review Monograph Series" as "Reverend Negotiable Fines," and another the same words as "News Enjoyable Lines."

These divisions into groups are not hard and fast, but shade into each other. In many cases it is difficult to tell whether a person is using a meaning or form basis in his response to the test.

Another division may be made of the subjects on the basis of their substitution or omission of difficult words. For instance, some subjects throughout the tests leave out words whenever they are in difficulty. This may be due to either of two reasons: the form may be absolutely meaningless to them, just a jumble of lines, or else may suggest a word which clearly is not the true one that corresponds to the form. Subjects who omit words because of this second reason must have a very clear form-perception.

The subjects that substitute, however, have not as clear a form-perception. Whether their substitution is on a meaning or form basis, the fact that they do not realize it is incorrect shows that their perception of either the illegible or the substituted form is not wholly adequate.

Many subjects both substituted and omitted words, but usually one or the other form of error predominated.

The above discussion holds for the unmutilated specimens. With the mutilated no such opportunity is given meaning to play its part. The same three classes of subjects, however, are found: first, those for whom the writing is legible and for whom the meaning fills the gaps to some extent; second, those who depend primarily upon meaning, and third, those who depend primarily on form.

The second class of subjects is rather difficult to isolate because of the slight utilization of meaning possible, but there is some evidence that such a class exists. For instance, in A 2 "somewhat" is read as "somewhere." Here the subject reads the "some" without much difficulty, and goes on to supply the "where" for the more illegible portion of the word.

Many instances might be taken from the reading of the mutilated specimens to show the existence of a third class. One will suffice. "Still continues lovely" was read as "Street avenues taken"; "Street Artemus ———"; "That creations I over"; "Street columns train"; "Still sometimes I only," etc.

The Completion (Ebbinghaus) Test.

In order to get some basis of comparison for the significance of the meaning factor in the reading of mirror-script and of illegible writing, two completion tests were tried. The first was Test No. 1, given in Whipple's "Manual of Mental and Physical Tests," page 448, and put out by Stoelting. The second was obtained by the cutting of words in a selection taken from the college paper of a date some six months previous on a subject, "Registration," with which all students were more or less familiar. The copy for each student was typewritten in a way similar to that of the printed tests.

The two tests were given at least a week apart during March, 1914. The instructions printed on the Stoelting sheet were given with such verbal supplementation as seemed necessary. In both tests the subject was given all the time he needed to fill out the blanks.

The time results in the first completion test varied from 5 min. 36 sec. to 25 min. 58 sec., with a range in valued errors of $3\frac{1}{2}$ to 63. In the second, much the easier test for most subjects, the time varied from 3 min. 16 sec. to 16 min. 10 sec., with a range in valued errors of 0 to $9\frac{1}{2}$. The 16 min. 10 sec. represents an extreme reached in only one case. The highest time without this for the second series is 8 min. 50 sec.

Results. The two completion tests on the time basis give a coefficient of correlation of .697. When these results are

weighted for errors the correlation drops to .621. It was found, when weighting for errors, that the final correlation could be made to vary from .570 to .700; depending upon the value assigned to the errors. The strictest method of weighting for errors gives a correlation of .621, which is about midway between the two extremes.

(To be concluded in the June number.)

AN OUTLINE FOR INSTITUTIONAL EDUCATION AND TREATMENT OF YOUNG OFFENDERS.

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We have often been asked during the last few years for a statement of what our experiences have taught us concerning the needs and possibilities of work in correctional institutions for young offenders—those of the training or industrial school type. We have all along been chary of making generalized suggestions, and have always been, and still are, thoroughly disinclined to say offhand what alterations will be profitable in any given institution—we know full well how conditions and inmates differ. In this paper, which is offered just now because we are asked for suggestions anent the building up of an entirely new institution, we are not aiming criticism at any particular place, although, naturally, we should be glad if workers in institutions find our outline of value. Many good people we have found in the service, and the best of them say that, like ourselves, they are searching for more light.

Our ideas are based somewhat on observation of various institutions for youthful delinquents, but a hundred times more upon our long diagnostic research into the needs and adjustabilities of delinquents and our study of the actual results of institutional training upon different persons. What we have to say can best be offered in the form of short summaries and schedules. Details would have to be worked up with due consideration of special situations and possibilities. We omit all dealing with administrative phases that are not of immediate therapeutic significance; for instance, it is of no use to discuss the possible officers of the institution as such—what they may be designated and what they may do depends on the size of the institution.

Our great insistence is upon the necessity for constant and common-sense consideration of the actual aim of these institutions and of the general activities by which alone they can ever be successful in large measure. (Through mere housing, tiding the offender over a period of adolescent instability and in the meantime affording some sort of regulated life, institutions always may achieve some success, but nothing like full efficiency.)

The main points for consideration are as follows:

A. The entire aim of the activities of a training school for delinquents is to fit the individual to cope with all phases of an ordinary social environment.

B. The human material to be worked on in this type of an institution must be selected for it by prior diagnosis. Uneducable persons do not belong therein. (Under the exigencies which some institutions have to meet, mental defectives are accepted, but, of course, needs of defectives are only to be fulfilled by giving them special discipline and education, with which we are not here concerned.)

C. Economies of the institution are always under consideration, and may well begin with problems of brick and mortar. When calculating even the first expenditures, the aim of the institution should be kept in mind. The physical equipment, providing it be safe, suitable, and hygienic, is one of the least considerations, inasmuch as it does not make directly for the upbuilding of moral life. Finance committees must remember that the main expenditures should be in offering salaries sufficient to secure the services of people who are properly trained to carry out the aims of the institution.

D. The selection of the working personnel is the most important single consideration. The influence of a man or woman of good understanding upon youthful delinquents, whenever in contact with them, is not to be overvalued. Good understanding itself, however, is not to be had without education in the subject of the particular needs of young people. A

special situation arises through the character-building aspects of this work—even the best planned course of training will fail if fitted persons do not direct these features.

The succeeding items of this outline will denote in large measure what the personnel should be. Here we may suggest that, outside of a few specialists, the prime requisite is capacity for social service. Much economy may be practiced by the selection of persons capable in more than one direction, especially those with ability to take care of other phases of activities besides formal education.

An important outcome of the application of scientific effort in this field is bound to be that it will attract many more competent people than heretofore.

E. A general plan for carrying out the real aims of the institution should be based on the fact that modification of bodily, mental, and character conditions, any or all of them, may be necessary.

- (a) The modification cannot always be thought of in terms of building up. For instance, the self-will of some young offenders is entirely too strong, the general physical well-being of others is too redundant for their moral welfare.
- (b) Likewise, there must be taken into account the possibilities of harmful modifications coming from throwing together a number of delinquents. Too often this is lost sight of. It begins with such simple possibilities as the spreading of disease, and involves also the most insidious forms of contagion in the moral sphere.

F. Planning of even the buildings should be primarily based upon the most fundamental points, namely, the mental and the physical needs of the inmates. There should be:

- (a) A receiving ward for physical and moral diagnosis before the delinquent is further placed. (In this the Hungarian scheme of observation for two or three weeks is admirable.) But it must also be remembered that segregation in this receiving ward is highly desirable, for the very worst may be com-

municated in a few hours. Separate rooms are here, then, most necessary. All contagious diseases can be discovered in the receiving ward.

- (b) Further planning of buildings must depend largely upon the whole nature of the institution. A small plant can continue the scheme of separate rooms. (From the larger institutions come reports that cottage life with small dormitories allow sufficiently for a varied classification of the population.) Without much classification running all through the institutional life, however, the best cannot be accomplished. Altogether, it seems likely that the single room idea gives possibilities of training which cannot be afforded in any other way, and that this idea, carried out, need not be very expensive. Some larger space must be allowed for cases which need close watching in sleeping hours—for this a dormitory is essential.

G. Diagnosis of the needs of the individual: This is absolutely essential for carrying out successful treatment, and all through should be correlated with the educational and other therapy. Earlier causative factors of the delinquency, such as defective heredity, conditions of environment, etc., of course, the diagnostician should know in detail. Whether the other institutional workers should go into this depends upon what type of work they are trying to do and what their training has been. (The idea of deliberately ignoring all that the delinquent has done previously, in order to let him charitably start with a clean record in the institution, is justifiable only when there is no such thorough diagnosis of causation as may give valuable suggestions for treatment.)

The work of the diagnostician is useful all the way through institutional life; it is not ended with admission or with the first cross-section study. It will be of special service in cases where some given form of treatment has failed; the cause of which failure and the needs of the future may be thus studied. Likewise, in case of outbreak of bad conduct, etc., diagnosis of causes is important.

- (a) Physical diagnosis: It goes without saying that all

definite diseases should be recognized. Then all general defective conditions, such as anemia, must be ascertained. Special weaknesses, or sources of irritation, which in some cases may be correlated with delinquency, should be sought for. Sensory defects are especially important to know.

(b) Psychological diagnosis:

1. Special mental disabilities, defects, or aberrational tendencies should be carefully studied.
2. Special talents or powers ought to be thoroughly recognized for the sake of their utilization whenever possible.
3. It also is very important to know the details of mental content which may be causative of the delinquency. For instance, undesirable obsessions and impulses must be diagnosed to be rationally counteracted.
4. The diagnostician must have knowledge of habits, both of mind and body. With some delinquents the treatment of these is absolutely necessary before there can be moral recovery. The study of habits ranges all the way from getting at what is habitually represented in the mind to ascertaining any physical sensations which may have untoward influences.

- (c) There should be a thorough diagnosis of the moral background of the individual in order to know what normal experiences have been left out or what features of experience perverted.

H. Conferences; staff meetings: To get co-operation in the work of an institution, staff meetings are absolutely indispensable. By their stimulation of interest they may prove nothing less than inspiring to the workers. Only by putting together what is known from different standpoints and from different observers can a true picture be had of the individual and the causes of his conduct.

I. Medical department: The needs of such a department vary tremendously with the special population, and the necessary equipment can only be determined in this light. Far less is needed in an institution for males than in one for females.

J. Records: Essential records of an institution are those which give such items of case histories as furnish data of value in relation to the aims and results of the institution. They should be totally different from the meager statements which are usually recorded. (Of course, we are not discussing at all in this paper any bookkeeping pertaining to the upkeep of the institution.)

The value of complete case records is the following: First, we have the value to the individual. One can only deal with him in the most efficient way by recording an accurate study of the facts concerning him. Good records focus on the point of his well-being and well-doing. Second, records of physical changes, mental growth, school work, and social behavior, when so made as to indicate the attainment or not of the ultimate purposes of the training, give some criterion of what the institution has been able to accomplish. This is not known otherwise with anything like the accuracy it should be, and remains one of the weakest phases of the whole situation of reformatory work. Third, by accumulation of this type of knowledge there may be a chance for professional training of institutional workers and for the future development of the art or science of training delinquents. It is astonishing that almost nothing has been worked up in any scientific way to this end.

K: Length of time in the institution: Notwithstanding difficulties that are urged against any plan other than that of uniformity of time to be served, it is clear from a practical and scientific standpoint that the period necessary for different individuals to be in an institution must vary greatly. The whole matter of character building cannot be measured in terms of days. Sometimes, in order to tide over a long period of instability, years of treatment are necessary, and then again a very short term will bring about a marked and satisfactory change. Variations of time are specially important

in the light of the fact that the delinquents enter at different ages.

L. Follow-up work: To get the proper social adjustment, after training has been given in the institution, is one of the most important activities. A probationary period is frequently most valuable, during which the individual is studied in his reactions to the new environment. Particularly to be noted is the frequent need after release for a change into a different environment from that where the delinquencies occurred. All sorts of psychological observations prove the wisdom of not renewing old social and mental associations—nothing is so uneconomical as to have a breakdown after years of educational treatment. Another reason for follow-up work is to ascertain the real merits and efficiencies of what has been done in the institution. Has the treatment really fitted the delinquent for normal social life? Furthermore, where the individual has acquired higher standards these should be satisfied.

M. Treatment in general: Before discussing specific phases of treatment its general methods and aims should be taken up.

- (a) The entire institutional life should be adjusted with the idea that it is treatment, that it is educational, and all to the end that the delinquent shall be better fitted to meet an outside environment.
- (b) This requires high individualization. One of the arguments against the advisability of a set system is found in the successes which are actually obtained by a rational and understanding approach to the problems of the individual. Both education and work must be adapted to individual needs.
- (c) Three things to avoid are any kind of deceit, the show of pedantry, and any demonstration of irrationality. It is most desirous to make the individual rational and honest, and this can only be done by showing a good example in these respects.
- (d) The method should be elastic in all ways, particularly in institutions for girls, where allowance must be made for outbreaks and explosions of pent-up

emotions and energies, either occasional or periodic. Of course, physical fluctuations must be allowed for.

- (e) Punishments: These must be highly individualized according to personalities involved. There is no doubt that stimulus to doing better is more apt to result from the promise of rewards than the administering of penalties. There must be goals toward which the delinquent is to work as the reward of good behavior. With constructive treatment the problems of discipline largely tend to disappear. It should be remembered that coercion and punishment by inflicting pain are the lowest levels of control.
- (f) Above all things, *mental vacuities*, either on week days or Sundays, must be prevented. "The empty mind is the devil's workshop." There should be abundant opportunity for good conversational reactions. This may be as important as formal instruction, and always the mental life should be the first and foremost consideration.
- (g) The whole institutional equipment should be used with the sole idea of its social and moral worth.
- (h) General social and educational life should include the planning of service and of rendering helpfulness to others in the institution. Cultivation of this is worth much, and from it can be built up larger ideas of social relationships. Perhaps the best way to avoid jealousies is to inculcate the idea of service, one to the other in the institution.
- (i) Intimate social life: One of the best helps toward a better life is an understanding friend and advisor with whom the cause and the help for trouble may be discussed.
- (j) In considering treatment in general it must not be thought that building up is always the point, or that positive habits are the only good; the inhibitions of bad impulses must be also considered. In some cases excessive physical vigor, or obstinacy of will, make special forms of modification necessary.

N. Dress: A moot question is ever the dress of the institutional inmates. One point stands out clearly proven, namely, that any self-expression that is practicable in this matter should be cultivated.

O. Work: The arrangement of work to be done by the inmates has its economic and also its social and moral values. The immediate economies must not conflict with the aims of the institution. If the work has a deteriorating effect, or is interfering with treatment, it should be done by outsiders. But this does not mean that difficult or even so-called menial work should be neglected.

The idea of duty on the part of the spelling may be cultivated, although perhaps with difficulty in early adolescence, through the understanding that the institution ought to be largely self-sustaining. Work of all kinds is done, chiefly for common welfare. If it is merely assigned as a matter of routine or punishment without this feeling, work is apt to be detrimental and cause a grudge.

Very much of housework and other work can be done in the spirit of scientific training. There may be attention to skill and success in many household occupations. It must be shrewdly recognized that there may be great benefits accruing to selected individuals through their engaging in hard labor, either physical or mental, or both.

P. Religion: Religious training would be out of place to discuss here. In general, we may say that religious training which takes the individual as one of a group and does not meet special problems is not apt to get results. Then it must be remembered, in all common sense, that natures differ greatly. The religious appeal is very strong in some, and others are oblivious to it.

Q. Plan of school training.

I. General underlying principle.

1. Emphasis of the *social* values in each subject of the curriculum.

(1) To be applied according to the needs of the pupils and the opportunities of the locality.

II. Specific purposes.

1. Creation of good habits of thought and conduct.
2. Creation of permanent wholesome interests.
3. Obtaining of knowledge that makes for better social functioning of the individual.

III. Central idea.

1. Social life and its manifold relations. This might center about the home, for girls, and about the industries, for boys.
 - (1) Relation to individual welfare and happiness, *e. g.*, questions of sanitation and hygiene in the home. (This particularly for girls.)
 - (2) Relation to civic life—social welfare, *e. g.*, questions of educational and recreational opportunities, political organizations, etc.
 - (3) Relation to industrial life, *e. g.*, vocational possibilities.

IV. Illustrations of points of attack in subjects of the curriculum.

1. Reading.

- (1) General point of view. No regular series of readers will suffice, since the subject-matter is not adapted to older pupils who often have had wide experience, but little educational training.
- (2) Possible plan.
 - (a) Leaflets especially prepared, dealing with current events, with phases of civic life, with processes of manufacture, with principles of hygiene and sanitation, with interesting and valuable information regarding historical and geographical events, with lives of interesting personages, etc.

- (b) A large part should be reading both by and to the class of good literature—purely for enjoyment and for development of appreciation.
- 2. Language.
 - (1) General point of view. Language should be taught for the purpose of developing powers of expression, and incidentally the teaching should give opportunity for the exchange of opinion.
 - (2) Plan.
 - (a) Free and frank discussion of actual living problems that arise daily, or that have arisen in the past. There should be no specified period for this, but it should be done as occasion arises.
 - (b) Retelling items of interest that have been read in or out of class, in magazines, etc.
- 3. Writing and spelling.
 - (1) General point of view. This should be a rational outgrowth of the above. Spelling then becomes that of words actually needed in every-day life.
- 4. Arithmetic.
 - (1) General point of view. This should emphasize applied features and give mastery of the tool aspects as needed for solving problems that may, probably will, actually arise.
 - (2) Plans.
 - (a) *E. g.*, even the processes of adding, subtracting, multiplying, dividing may be based on keeping household and other accounts.
 - (b) Later study of interest, understanding of checks and simple banking knowledge.

- (c) Application in cooking classes, in discussions of food values, in dressmaking and art courses, in the case of girls; in manual training and other occupations, in the case of boys.
5. Aesthetic training.
- (1) General point of view. This should be purely from social standpoint. It should deal altogether with applied art, and should emphasize technique only as that is needed. Its aim should be, not artistic creation, but appreciation and the expression of choice.
 - (2) Art.
 - (a) Principles of art as applied in design and decoration, principles of color combination, of form. For girls, particularly household design, home furnishing, etc.
 - (b) Familiarity with good pictures, both of painting and sculpture. Discussions of same as to what is liked and why, leading to standards of value.
 - (3) Music.
 - (a) Here again, not for technique, but for spontaneous and joyful expression.
 - (b) Familiarity with good music to develop appreciation. Good music should be heard through the medium of performers, player-piano, victrola, and discussion regarding individual preferences should follow.
 - (4) Dramatic performances.
 - (a) With younger children this may be simple dramatizing of stories read.

- (b) With older children it may take the form of dramatic performances, giving opportunity for self-expression, for pleasure and recreation. (This offers a splendid chance for co-operation and mutual helpfulness in making costumes, decorating, etc.)

6. Geography.

- (1) This might well begin with the home, then take into consideration the State, then the United States and other countries. It should emphasize relationships, industrial, cultural, historical.

7. History.

- (1) This might be presented from the same point of view as the above. Discuss current events, holidays, etc., and gradually develop systematic view of United States history. The amount of detail would depend on the time available, possibly only the high points might be included.

8. Domestic art and science (for girls).

- (1) This depends on the equipment and amount of training obtained in the actual running of the institution. Where girls are taught to cook in the kitchen of the institution, much might be added in school by giving the scientific principles underlying household management. Where they receive no such practical training, cooking classes should be conducted as part of the school curriculum.
- (2) The same is true as regards sewing. If not taught elsewhere, it should also form a part of the school course.

9. Nature study.

- (1) This and related topics depends on the facilities of outdoor life. Farming, for boys, and at least gardening, for girls, should be part of the activities. This might be made the basis of much useful and helpful work.

10. Self-government.

- (1) There should be an opportunity for this somewhere, even though outside control is necessary to some extent. It not only affords an approach to principles of civic government, but gives scope to develop wisely-controlled ability in leadership.

11. Physical training.

- (1) Point of view. This is twofold; on the one hand, it gives an opportunity for developing control and good habits; on the other, it affords wholesome recreation.
- (2) Plan of work.
 - (a) Drills for developing accuracy in movement, physical control and promptness of action. Particularly true in military drills or setting-up exercises for boys and gymnastics for girls.
 - (b) Folk dancing for girls. This is really an art form which permits of general social participation and pleasure.
 - (c) Outdoor games; team games not only afford exercise, but develop class spirit, sense of fair play, etc.

12. Vocational training.

- (1) This, where possible, should be incorporated in the school training of both boys and girls, but particularly in the case of

the former. It might even be made the core of all school work. It would not preclude the necessity for much of the training outlined above; the two should go hand in hand. The relative emphasis depends on the amount of time available for school work.

13. Special instruction. This should be given to meet individual problems; there should be an opportunity for correction of various types of individual difficulties. Thus—

- (1) Corrective gymnastics for physical disabilities.
- (2) Special teaching for specialized mental disabilities, *e. g.*, in arithmetic, language, reading, etc.
- (3) Training for development of special talents not adequately given in ordinary classes.
- (4) Corrective work for sensory and motor defects, such as speech difficulties.
- (5) Special counteractive aids for those whose delinquencies arise on a basis of obsessive mental imagery.

No one of these necessitates the withdrawal from the ordinary classroom during the whole day or the formation of special classes. The special teacher should give daily such time as the individual case requires in the special field, whereas other work can be carried on in the regular classroom. The co-operation between teacher and diagnostician should be particularly close in these cases.

R. Recreation.

- I. Sufficient discussion in regard to this feature has been given incidental to other points. Much under the head of aesthetic training, under physical training and elsewhere is pertinent here. The

need for genuine recreation is universally recognized, and many wholesome forms of it can be devised and correlated with special needs of the individual.

We would firmly contend that the above scheme is not Utopian; it is thoroughly practicable where a group of intelligent and well-trained workers can be gathered in an institution. The basis of our survey of the subject is simply, as we have said, experiences with needs of delinquents, and successes and failures of treatment. If our ideas of constructive efforts appear complex and difficult, it must be remembered that they are not any more so than the details of education and home life in any well-conducted school and family. As for ultimate values accruing from such efforts—well, we are told that in Heaven there is much rejoicing over even one delinquent saved.

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EDITORIALS.

The Cincinnati meeting of the Department of Superintendence, while the largest in point of attendance and one of the pleasantest in point of the entertainment provided by the local committees, was marred by unfortunate program conditions. The advocates of the more radical plans of administrative reorganization, and especially the proponents of the shortening of the elementary curriculum and the forcing of early vocational choices upon boys and girls, had everything their own way in the meetings immediately preceding the vote on resolutions. As a consequence, a most dangerous resolution indorsing for the seventh and eighth grades differentiated courses designed to prepare pupils for their "possible future activities" went through with only a slight protest. The wording of the resolution leaves no doubt as to its meaning, whatever may have been in the minds of those who framed it. It commits the department to vocational differentiation at the age of 12. Naturally, it has been seized upon by the advocates of a radical 6-6 organization as an indorsement of their plans—as, in fact, it is. At the same time, it has been advanced by the advocates of the dual system of vocational schools as another indi-

cation that the school men are not sincere in their protestations anent the essential democracy of the public schools—an unwarranted inference, for the advocates of early differentiation have been basing their arguments on individual differences, the awful statistics of elimination, the archaic unfitness of the traditional curriculum, the inherent privileges of the “golden age of adolescence,” the exclusive effectiveness of a vitalizing “life motive,” and a host of other arguments that have blinded many sincere school men to the grave social dangers that are involved in the proposals.

The Monday evening meeting of the National Society for the Study of Education was so attractive that many who sought admittance had to be turned away. The Yearbook pre-

THE MEETING OF THE NATIONAL SOCIETY

sented the results of the extensive investigations of “minimal essentials” made under the auspices of the Department Committee on Economy of Time. It was a happy thought to devote the Yearbook to the report of this committee. Both in the meeting of the Society and in the Friday meeting of the Department, the papers were thoroughly discussed. The Society has prospered marvelously under the direction of Prof. S. C. Parker, who has held the secretaryship for the past five years. During this time the sessions of the Society have probably ranked next to those of the Department itself in attractiveness to those attending the February meetings. Members of the Society learned with regret that the pressure of other duties would necessitate Professor Parker’s withdrawal from this important office. Acting upon the precedent of having in this position a man of recognized standing and scholarly achievement, the executive committee asked Prof. G. M. Whipple to take Professor Parker’s place. A continuance of the good work has been assured by Professor Whipple’s acceptance.

The College Teachers of Education did not fare so well as the National Society. The Yearbook was marred by the omission of important material submitted by the

THE COLLEGE TEACHERS OF EDUCATION

contributors, but eliminated by the editor because of the necessity of confining the book to a reasonable amount of space. Two very good statistical articles were published with

sufficient detail to make them valuable—one by Dr. F. L. Clapp of the University of Colorado and the other by Dr. A. C. Boyce of the University of Chicago, each a part of the Committee on the Rating of Teachers. Prof. C. H. Judd was elected president of the Society for the ensuing year, Prof. G. M. Wilson of the Iowa State College is secretary-treasurer, and Dean J. E. Russell is the new member of the executive committee.

W. C. B.

NOTES AND NEWS.

The second annual conference on Educational Measurements, under the auspices of the Extension Division of Indiana University, was held at Bloomington, Ind., April 16 and 17. The speakers from abroad were Mr. S. A. Courtis, Director of Department of Educational Research, Detroit Public Schools, and Dr. Leonard P. Ayres, Director of Division of Education, Russell Sage Foundation. Mr. Courtis gave addresses on the following topics: "Supervisory Control by Means of Objective Standards," "Limitation of Training," and "Educational Diagnosis," and Dr. Ayres discussed "Making Education Definite," "The Measurement of Educational Processes and Products," and "A Survey of School Surveys." In addition, there was a symposium on "Co-operative Research," participated in by Superintendents O. C. Pratt and E. C. Stopher and Prof. M. E. Haggerty, and a session devoted to the evaluation of the results of high school teaching.

It is significant of the trend of interest in education that at the dedication exercises of the Wisconsin High School, the secondary school connected with the department of education of the University of Wisconsin, on April 1-3, there was held a series of conferences on the subject of "Educational Measurement in the High School." These conferences were presided over by Prof. E. L. Thorndike of Teachers' College, Columbia University, and dealt with measurements in the fields of arithmetic, algebra, English, physics and vocational guidance.

At the annual conference of Minnesota Superintendents and Principals, held at the University of Minnesota, March 31-April 3, the visiting speakers were Prof. Charles H. Judd, Director of the School of Education, University of Chicago; Prof. W. A. Jessup, State University of Iowa; President Carroll G. Pearse, State Normal School, Milwaukee, and Prof. G. D. Strayer, Teachers' College, Columbia University. Professor Judd spoke on "Supervision Through Scientific Studies," "Scientific Supervision of Special Subjects," and "Scientific Supervision of General Organization"; Professor Strayer discussed "Supervision in Relation to the Art of Teaching," "The Criticism of Instruction," and "School Surveys:

Their Nature, Method and Scope," and Professor Jessup considered "Right Relations Between Teachers and Supervisors." There was also a paper on "Practical Tests as an Aid to Effective Supervision," by Supt. H. A. Johnson. During the same week the seventh annual meeting of the Minnesota Psychological Conference was held, and the program centered on educational tests. There were papers on "Tests of Reading," by B. F. Pittenger; "Tests of Writing," by F. L. Whitney; "Tests of Arithmetic," by Albert Gullette; "The Psychology of Expression," by J. S. Gaylord; "Mental Tests and Their Relation to School Standards," by E. R. Collins, and "Measurement of School Work," by J. L. Stockton.

At the Cincinnati meetings of the Department of Superintendence a new society was organized by those who are interested in educational research in school systems. Frank W. Ballou, director of educational research and measurements, Boston, was elected president, and George Melcher, director of educational research and efficiency, Kansas City, Mo., was chosen secretary.

The recent conference of educational workers, held at the University of Kansas, was largely attended by the schoolmen of that State, and much interest was developed. The principal extra-mural speakers were Prof. C. H. Judd of the University of Chicago, who spoke upon the proposed reorganization of the elementary and high school curriculums, and Prof. G. M. Whipple of the University of Illinois, who spoke upon the problem of the gifted child. Among other round-table discussions was one devoted to the problem of the textbook in psychology for use in high school centers for the training of teachers.

The thirteenth annual meeting of the Brown University Teachers' Association, held at Providence, R. I., April 16 and 17, was devoted to two general topics—"Efficiency in Education," and "Character, a Neglected Standard in Education."

Dr. Thomas H. Haines, director of the Ohio Bureau of Juvenile Research, has recently issued a program of the new bureau, setting forth its aims and possibilities. The juvenile courts of the State are sending over 100 juvenile delinquents to the State industrial schools each month. Preliminary surveys have indicated that from 60 to 70 per cent. of these are morons. The proper and economical treatment of these unfortunates constitutes the problem of the

bureau. A solution of the problem will demand studies of the biologic character of the family, of the home conditions and the past personal history of the individual, physical examinations, and mental tests. Finally, the task of following up these young people and placing them in an environment that will not try them too severely, but will help them to develop all the usefulness of which they are capable, involves a sociological experiment of great interest and magnitude.

The Illinois State Society of the American Institute of Criminal Law and Criminology will give attention in its June meeting to a discussion of the relation between psychology and jurisprudence, with special reference to the use of mental tests in the administration of juvenile courts, and the like. A paper on this topic will be read by Dr. George Ordahl, who has succeeded Dr. Clara Town as State Psychologist, with headquarters at the Lincoln State School and Colony.

The Journal of Criminal Law and Criminology is entering upon the publication of a series of monograph supplements which will be known as Criminal Science Monographs. The first monograph is now in the press. It will appear early next fall under the title "Pathological Swindling and Lying." Dr. William Healy of Chicago is the author. The volume will approximate 200 pages. Each number in this series will be attractively bound in cloth, and will come from the press of Little, Brown & Co., Boston, Mass. Persons who have manuscripts in hand or in preparation which they wish to have considered for publication in this series should communicate with Prof. Robert H. Gault, Northwestern University, Evanston, Ill.

Announcements of the coming summer session at New York University show that the special course for the training of teachers of mentally subnormal children is to be continued and still further elaborated. Instruction will be given, among others, by Professor Gesell of Yale University, Professor Gault of Northwestern University and Dr. Goddard and Mr. Doll of the Vineland Training School.

The National Association for the Study and Education of Exceptional Children announces the opening of an educational clinic at Plainfield, N. J. The purpose of the clinic is "to apply physiological, psychological and mental (!) tests to children of all ages, to deter-

mine, as far as possible, their exact combination as to physical and mental conditions, aptitudes and handicaps, and the causes of eventual difficulty. Its objects are to analyze the excellencies and difficulties of those children who have strong native abilities, but whose progress in school and in life offers puzzling individual problems, to rescue the misunderstood and handicapped child from becoming a misfit or a failure, and to provide opportunities for its development along the lines of its particular talents and abilities." The services of the clinic will be given free to children referred to it by public school authorities, juvenile courts, and charity organizations.

The *Paedagogisch-Psychologische Arbeiten aus dem Institut des Leipziger Lehrervereins*, which are now in their fifth volume, contain valuable contributions to child psychology and to the learning process. The volumes present researches on attention, on the development of the color sense, on learning and retention, on the effect of questions, on linguistic invention, on fatigue studies, on the results of practice, on the relation between physical and mental efficiency, and on the individual differences in mental accomplishment shown by children at different ages.

It is gratifying to learn that the rumored destruction of the trained horses of Elberfield was not in accordance with the facts. Herr Krall, the owner, writes that they are unharmed and in the hands of a competent horseman, but that the experiments on them have been suspended on account of the war.

The eighth annual meeting of the American School Hygiene Association will take place in the city of San Francisco, June 25-26, 1915. Arrangements for this meeting are being made through the organization committee, of which Prof. Lewis M. Terman, Stanford University, California, is chairman. Professor Terman is also chairman of the program committee.—*Science*.

Supt. Joseph M. Gwinn of the New Orleans Public Schools organized a course of weekly lectures from March 26 to May 28 on "The Medical and Social Aspects of Hygiene." Among the topics announced were "Physical Health and Juvenile Delinquency," "Oral Hygiene," "Nutrition in Infancy and Childhood," "Significance of Physical Measurements of Children," "Nervous and Mental Hygiene," and "How Teachers May Help the Medical Inspector."

The summer courses at the Johns Hopkins University will this year include graduate courses in a number of departments. These advanced courses will be offered in partial fulfillment of the requirements for the degree of Master of Arts. The residence requirement for this degree is at least two years, and the arrangement for summer graduate courses provides that one of these two years may be satisfied by attendance and study during not less than three sessions of the summer courses. The session in 1915 will open July 5 and continue six weeks.

Among the courses announced by the Division of Education of Harvard University for next year are Educational Psychology, Statistical and Experimental Studies in Education, School Hygiene, Seminary in Mental and Physical Development in the Individual, and Research Seminary in Educational Psychology.

Communications to the National Society for the Study of Education should be addressed to Prof. G. M. Whipple, Urbana, Ill., who has succeeded Dean S. Chester Parker of the University of Chicago as secretary-treasurer of the organization.

In connection with the European turmoil, we note that Prof. C. S. Spearman, well known for his work in correlational psychology, has joined the English army. Prof. Ed. Claparède, psychologist at the University of Geneva, writes to *Science* that it was not he, but his cousin, the jurist, who was dismissed from that institution on account of his utterances anent the situation in Belgium.

Prof. W. C. Bagley has obtained a half-time leave of absence from his duties as Director of the School of Education at the University of Illinois, and is devoting alternate weeks to a study of the training of teachers in the State of Missouri in behalf of the Carnegie Foundation.

Dr. Truman Lee Kelley, instructor in educational psychology, University of Texas, will give courses in elementary and physiological psychology, in the psychology and education of exceptional children, and in the diagnosis and treatment of exceptional children at the summer school of the George Peabody College for Teachers, Nashville, Tenn.

PUBLICATIONS RECEIVED.

(Notice in this section does not preclude a more extended review.)

JOHN ADAMS. *Making the Most of One's Self*. New York: George H. Doran & Co., 1915. Pp. vi, 290. \$1.00.

This is a popular discussion of certain features of psychology as they appear in education, and is intended as "A Guide for All Students." The style, as one might expect from this genial author, is a model of smoothness and grace. This literary element is rarely found in American books on educational psychology, and is apt to give the scientific student of education the impression of superficiality. For the general reader, however, this excellence of style will be distinctly to the author's credit. Some of the topics considered include reflections on fatigue, manipulation of the memory, the nature of study and thinking, mode of study, reading, the use of textbooks, note-taking, translation, essay writing, and the psychology of examinations. It is a book that is eminently worth while for students to read.

JAMES MARK BALDWIN. *Genetic Theory of Reality*. New York: G. P. Putnam's Sons, 1915. Pp. xvii, 335. \$2.00.

The subtitle of this book is "The Outcome of Genetic Logic as Issuing in the Esthetic Theory of Reality, Called Pancalism, with an Extended Glossary of Terms." It takes the place of the projected fourth volume of "Thought and Things or Genetic Logic." It is presented by the author as a kind of introduction to philosophy—if philosophy be interpreted as inclusive of science, and not contrasted with it. It is perhaps the best brief summary of the author's position on questions of psychology, logic, and philosophy.

ALBERT G. BELDING. *Accounts and Accounting Practice*. Cincinnati: American Book Co., 1915. Pp. 224.

An elementary textbook in accounting characterized by an abundance of illustrations and problems from actual business situations.

J. C. BROWN. *Curricula in Mathematics. A Comparison of Courses in the Countries Represented in the International Commission on the Teaching of Mathematics*. Bulletin No. 619. Washington: Bureau of Education, 1915. Pp. 91.

The author first presents an account of the general arrangement of courses in the typical schools of the various countries, and then considers the work in mathematics in all the countries by school years. This condensed and authoritative epitome of the work in

mathematics in civilized countries will be a great boon to those who are interested in the progress of the teaching of special subjects. There is a final chapter setting forth certain points of difference between the work in mathematics abroad and in the United States.

S. A. COURTIS. *Supervisory Graph for the Courtis Standard Research Tests in Arithmetic*. Series B. Detroit, Mich., 1915. Pp. 16.

The author presents a new type of graph for recording results of standard scores, and gives numerous illustrations of its use in representing returns from over 300 classes during the years 1913 and 1914.

HENRY C. COWLES AND JOHN C. COULTER. *A Spring Flora for High Schools*. Cincinnati: The American Book Co., 1915. Pp. 144.

This little book is designed to provide for young people in high schools a ready means for the identification of the more common and widespread spring flowering plants. It contains an analytical key of 28 pages, almost 100 pages of descriptive flora, and a glossary. It is designed especially for use in the North Central and Eastern States.

JESSE BUTTRICK DAVIS. *Vocational and Moral Guidance*. Boston: Ginn & Co., 1914. Pp. viii, 303. \$1.25.

Attention has already been called in these columns to the valuable co-operation between the teachers of English in the elementary and high schools of Grand Rapids and the authorities of the public library in getting before the pupils of the schools the necessary data for the choice of a vocation. The present volume, by the principal of the high school and director of vocational guidance, sets forth the details of the scheme and gives an extended account of its functioning. In part two is presented a series of brief accounts of the way in which the demand for vocational guidance has been met in various localities. The work is of especial value on account of its selected bibliographies.

JUNE E. DOWNEY. *On the Reading and Writing of Mirror-Script*. Reprinted from the *Psychological Review*, Vol. XXI, No. 6, November, 1914. Pp. 408-441.

There is a report on a case of spontaneous right-hand mirror-writing, a survey of the literature of the subject, a study of individual variation in the ability to read mirror-script, and an account of a series of experiments in writing mirror-script. Skill in reading mirror-script showed a high correlation with skill in writing it when the right hand was used, but a much lower correlation in the case of the left hand.

MARGARET DRUMMOND. *Report of Experiments with Montessori Apparatus in the Free Kindergarten, Reed's Court, Cannongate.* Pedagogical Laboratory Reports, No. 1. Edinburgh: Provisional Committee for the Training of Teachers, 1914. Pp. 39. Three pence.

A detailed account of the progress of 10 children in the use of the Montessori apparatus at three different periods of about 30 days each. It is the most scientific study of the effects of the use of the Montessori apparatus and methods that has yet been published.

FRANK NUGENT FREEMAN. *An Experimental Study of Handwriting.* Psychological Monographs, No. 75, 1914. Pp. 46.

"The experiment here reported consisted in an analysis of the handwriting movement of adults and of children by measurements of the size, speed, and pressure of writing. Writing is characterized by a decided rhythm, which is more pronounced in the developed than in the undeveloped movement. The writing of children is less rhythmical, less organized, and less automatized. That the child gives more continuous attention to the details of the writing movement is inferred from the fact that the movement is more uniform in speed throughout the different parts of the letter." The monograph consists of a historical sketch, a description of the apparatus, and a discussion of the results. There are 10 plates illustrating the analysis of typical letters.

FRANK NUGENT FREEMAN. *The Teaching of Handwriting.* Boston: Houghton, Mifflin Company, 1914. Pp. x, 156. 60 cents.

This little volume in the Riverside Educational Monographs is a discussion of the fundamentals of teaching handwriting from the point of view of the results of scientific investigation. Professor Freeman is recognized as an authority on the scientific study of writing movements, and teachers are to be congratulated that he has here put in simple and compact form the results of his work in this field. In an appendix there are five charts, showing the different degrees of uniformity of slant, alignment, letter formation, and spacing.

J. A. GREEN. *Life and Works of Pestalozzi.* Baltimore: Warwick & York, Inc., 1915. Pp. viii, 393. \$1.40.

Perhaps no educational theorist of the past has had a greater influence in moulding the practice of the schools than has Pestalozzi. The present survey of his life and work by the well-known English educator is a noteworthy contribution to the literature of the history of education. The book is divided into three parts, the first of which is biographical and presents a complete translation of what is known as the "Diary." The second part consists of a critical account of Pestalozzi's doctrines, and part three presents extracts and pas-

sages translated from educational writings of Pestalozzi and from other educators bearing on Pestalozzi's works. The book concludes with a complete bibliography of Pestalozzi's writings.

FRANK HERBERT HAYWARD. *The Lesson in Appreciation. An Essay on the Pedagogics of Beauty.* The Macmillan Company, 1915. Pp. xv, 234. 75 cents.

This is the first volume of what is to be known as "The Modern Teachers' Series," edited by William Chandler Bagley. In his introduction to the series the editor lays stress on the need for the co-operation of educational specialists with the public and teachers, to lay down detailed specifications, after the manner of the practical engineer, for carrying out the aims of education. There is much talk of appreciation in literature, music and art, but little detailed advice as to how such appreciation can be secured. Teachers are eager to build up appreciation, but lack the technical knowledge and technical skill to plan and to construct the edifice. The present book aims to furnish such specific directions. The author writes from extended and successful experience in the teaching of literature, but he frankly admits that his discussions of pictorial and plastic art rest upon a less definite basis. Nevertheless, his intimacy with the general attitude of school children lends weight to his suggestions.

V. M. HILLYER. *Child Training.* New York: The Century Company, 1915. Pp. xli, 299. \$1.60.

This book is intended as "a practical daily handbook for every parent of a child under seven." It emphasizes drill in the formation of habits, and aims to produce children who will be more observant and attentive, who will show more originality, more initiative, and sharper wits; who will think and act more quickly, be better informed and more accomplished, more skilful with their hands, more courteous and considerate of others, and, above all, healthier animals. It deals with habit drills, social training, story-telling, physical training, the rhythmic arts, free play, manual training, and the acquisition of information, especially through reading and writing. It is a book of practical value for every parent of young children.

TRUMAN LEE KELLEY. *Educational Guidance. An Experimental Study in the Analysis and Prediction of Ability of High School Pupils.* Columbia University Contributions to Education, No. 71. New York: Teachers' College, Columbia University, 1914. Pp. vi, 116. \$2.00.

This is a valuable contribution to the establishment of educational guidance upon a scientific basis. Factors entering into efficient guidance are a correct understanding of the demands of prospective tasks and an accurate evaluation of the ability of the per-

son in question to meet these demands. The latter phase of the problem sets the task for this study. The essential contribution of the monograph is the method for calculating the correlation between the estimate of a person's fitness for a task and his later performance in it. The tests used were an algebra test, a geometry test, an English test, a history test, and various tests of pupils' interests. Results of these tests were correlated with the standing of the pupils in the elementary school grades and with their attainments in the high school, and in this manner the reliability of forecasts of the pupils' subsequent success was definitely determined.

JOSEPH KENNEDY. *Rural Life and the Rural School*. Cincinnati: The American Book Co., 1915. Pp. 189.

This book is addressed to the farmer and his wife, to the teachers of rural schools, to public-spirited school boards, and to the leaders of rural communities and social centers. The author believes that many present conceptions "like those of the personality of the teacher, standards for teaching, supervision, school equipment, salary," etc., must first be dis-established, and then higher and better ones substituted. The author discusses the conditions of rural life, the trend to the city, inventions utilized by the farmer, the function of the school in improving rural life, the teacher, the curriculum, the function of supervision, consolidation of schools, and the prospects of rural life. There is a brief bibliography.

WILLIAM S. LEARNED. *A School System as an Educational Laboratory*. Harvard-Newton Bulletins, No. 1. Cambridge, Mass.: Harvard University Press, 1914. Pp. 50.

This bulletin gives an account of the agreement entered into between the Newton public schools and the division of education of Harvard University for the scientific investigation and practical improvement of educational conditions. Among the problems proposed for investigation are differentiation of instruction on the basis of capacity, independent work by pupils, the most advantageous disposition of the study period, the best treatment of reviews, speed tests in special topics, the improvements of the vocations of pupils, the development of a uniform character analysis, the scientific study of individual problem cases, articulation of high and grammar schools, invention of tests and scales for the objective measurement of school abilities, division of labor in teaching, and the psychological analysis of successful teachers. The arrangement represents one of the most interesting and promising educational movements started in this country.

R. E. LLOYD. *What is Adaptation?* New York: Longmans, Green & Co., 1914. Pp. xi, 110. \$1.00.

Ever since the theory of natural selection has been recognized by biologists as insufficient to account for the modifications of species

a need has been felt for an explanation of adaptation. The author cuts the knot by stating that there is nothing in adaptation to be explained. The need for explanation arises from a wrong point of view, and is based on wonder at the resemblance between organisms and mechanisms. The book is an attack on the mechanistic conception of life and an argument in favor of vitalism. The author everywhere acknowledges his indebtedness to Bergson for his fundamental conceptions of vitalism.

JOSEPH McCABE. *The Principles of Evolution*. Baltimore: Warwick & York, Inc., 1915. Pp. 264. 40 cents.

A popular account of the development of evolutionary theory, and a statement of fundamental principles. Chapter one traces the history of the evolutionary idea from the Greeks to the present time. Chapter two is a condensed summary of the proofs of evolution. Subsequent chapters deal with natural selection, internal agencies of evolution, problems of organic evolution, the evolution of matter, social evolution, and the range and philosophy of evolution. The book will assist in obtaining a wider currency for the evolutionary point of view, and in giving popular philosophy a biological coloring.

THOMAS VERNER MOORE. *A Historical Introduction to Ethics*. Cincinnati: American Book Co., 1915. Pp. xii, 164.

An elementary treatise on ethics for use in Catholic schools. The method of approach is historical, and part three embodies a criticism of moral systems. The psychological basis does not stray far from Thomas Aquinas.

AUGUSTUS DE MORGAN. *Essays on the Life and Work of Newton*.

Edited, with notes and appendices, by P. E. B. Jourdain. Chicago: Open Court Publishing Co., 1914. Pp. xiv, 198.

A collection of papers on Newton and his work written by De Morgan and published in journals and reviews during his lifetime. The sketch of Newton's life, which constitutes the first essay, is especially important because it was one of the earliest attempts to reveal Newton as something less than a demigod, while at the same time it does ample justice to the genius of the great English scientist. It was first published in 1846. The second essay outlines the controversy over the discovery of the differential calculus—the controversy in which the claims of Leibniz were so shabbily treated by the followers of Newton. The third paper is De Morgan's review of Brewster's *Memoirs of Newton*, published in 1855. The editor contributes two appendices in addition to the critical annotations of De Morgan's text.

E. R. MURRAY. *Froebel as a Pioneer in Modern Psychology*. Baltimore: Warwick & York, Inc., 1914. Pp. viii, 230. \$1.25.

The author has performed a valuable service in setting forth the significance of Froebel as a psychologist. Froebel's influence upon

primary education through the establishment of the kindergarten has been so remarkable as to overshadow his more strictly psychological views. These are here set forth with all the enthusiasm of an ardent disciple, and with frequent reference to the most recent views of the application of psychology to education.

STEPHEN PAGET. *The New Parent's Assistant*. New York: The Macmillan Company, 1914. Pp. xiii, 119. \$1.25.

These delightful little essays on things in general, in so far as they relate to children, seem to be written just for the author's love of giving utterance to his thoughts. They are charmingly smooth and polished, but the reader must not be in too great a hurry to get anywhere. The satisfaction comes from jogging along the highways and byways of educational thinking with the genial and loquacious author as a guide. If you have the time and inclination, it is all very delectable.

SAMUEL CHESTER PARKER. *Methods of Teaching in High Schools*. Boston: Ginn & Co., 1915. Pp. xxv, 529. \$1.50.

There are many books on general method, and other books on methods of teaching special subjects in the high school, but this is the first attempt to discuss in a single volume the general principles underlying all high school teaching and the elements of method that are of general application to high school subjects. We have specialized so much in high school work, we have attempted so vigorously to shut off the various high school subjects from each other and confine them in water-tight compartments that it impresses one as a bold undertaking to attempt to derive general high school methods. Undoubtedly, this specialization has gone too far, and in their zeal to teach their subjects high school teachers are prone to overlook the fact that they are teaching boys and girls. The present text will provide a valuable corrective to this serious error. Throughout the book two fundamental principles are emphasized: first, the need of adapting high school instruction to the capacities of individual boys and girls, and secondly, the subordination of high school teaching to the social needs of the pupils and the community. A third aim includes the application of the principles of scientific business management to the activities of teaching in the high school. High school methods are based upon five topics or aspects of learning, namely, acquiring motor control, associating symbols and meaning, practice or drill, reflective thinking, and habits of harmless enjoyment. There are valuable chapters on the training of expression, getting students in the proper frame of mind, adapting class instruction to individual conditions, supervised study, the use of books, laboratory methods, the art of questioning, practice teaching and lesson planning, and measuring the results of teaching. There are extensive quotations from recent contributions to experimental

education, so that the volume has something of the value of a source-book. There is a helpful list of references at the end of each chapter.

S. POLAK AND H. C. QUILTER. *The Teaching of Drawing—Its Aims and Methods*. Baltimore: Warwick & York, Inc., 1915. Pp. viii, 168. 85 cents.

Drawing is a natural form of expression in which the young child delights, and if pains are taken to judiciously foster this interest, all students may develop a considerable degree of proficiency in it. Unfortunately, much of the teaching of drawing proceeds from the development of this or that system, overlooking the interests and capacities of the pupils, and thus making drudgery of that which should afford delight. In the present book it is the author's endeavor to work out a scheme of teaching drawing from the point of view of the pupil's interest. The work will be of distinct value not only to the special teacher of drawing, but to every class teacher.

JOHN RENNIE. *The Aims and Methods of Nature Study—A Guide for Teachers*. Baltimore: Warwick & York, Inc., 1915. Pp. xvi, 352. \$1.10.

This is an excellent manual for the elementary teacher's library, affording all sorts of material about physical nature, and animal and vegetable life that can be brought into the class work with great interest and profit to the pupils. It is not to be used as a text, nor would it be advisable for the teacher to follow the chapters or the topics too slavishly. In the hands of a skilful teacher, it can be made to contribute very materially to genuine progress in the pupil's thinking.

A. J. ROSANOFF. *Preliminary Report of a Higher Scale of Mental Measurement*. Reprinted from New York State Hospital Bulletin, November, 1914. Pp. 10.

One hundred stimulus words were so selected as to include terms that occur in school subjects, such as arithmetic, grammar, geography, history, algebra, literature, civics, trigonometry, physics, biology, etc. To each of these words the author is collecting association reactions from four classes of people: first, those who have had not more than four elementary school years of education; second, those who have had eight elementary school years; third, those who have had four high school years, and fourth, those who have had four collegiate years. Four illustrative records are presented, showing the differences in the responses of individuals of different educational attainments.

EDGAR SCHUSTER. *Eugenics*. Baltimore: Warwick & York, Inc., 1915. Pp. 264. 40 cents.

This is number one of The Nation's Library, and gives a popular account of the scientific basis of eugenics and the goal toward which

the advocates of eugenics are striving. There is an account of Sir Francis Galton and his influence upon the eugenics movement, a discussion of Mendelism, a popular account of inheritance studies, a discussion of the influence of environment, and suggestions for a practical policy of social control. The book is to be cordially commended as a simple presentation of the facts on this momentous question.

Society of College Teachers of Education, Cincinnati, 1915; Work in Education in Colleges and Universities, Rating, Placing, and Promotion of Teachers. Chicago: University of Chicago Press, 1915. School Review Monographs, No. 6. Pp. 94. 55 cents.

The papers presented for discussion at the Cincinnati meeting of the Society include "Aims of Departments of Education in Colleges and Universities," by Carter Alexander; "Facilities for Teacher-training in Colleges and Universities," by Charles Hughes Johnston; "Credit Granted by Colleges and Universities to Graduates of Normal Schools," by William C. Reudiger; "Recognition Given College Graduates in the Granting of Teachers' Certificates," by Harlan Updergraff; "Report of the Committee on the Rating, Placing and Promotion of Teachers," by Frank E. Thompson; "Scholarship in Relation to Teaching Efficiency," by F. L. Clapp, and "A Method for Guiding and Controlling the Judging of Teaching Efficiency," by A. C. Boyce.

PERCY GOLDTHWAIT STILES. *The Nervous System and Its Conservation.* Philadelphia: W. B. Saunders Company, 1914. Pp. 229. \$1.25.

This little book represents an attempt to combine for college students surveys of the anatomy, physiology and hygiene of the nervous system. There is a good elementary discussion of the histology and physiology of nervous reflexes, the constituent parts of the nervous system, neural functioning in emotion, sleep and dreams, and the causes of nervous breakdown and neurasthenia. The book affords excellent supplementary reading for classes in introductory psychology.

LEWIS M. TERMAN. *The Effects of School Life Upon the Nutritive Processes, Health, and the Composition of the Blood.* Reprinted from the Popular Science Monthly, March, 1914. Pp. 257-264.

From a biological and evolutionary point of view the modern school involves a highly artificial type of activity for which the normal boy and girl is very badly adjusted. All too often in the efforts of pupils and teacher to secure this adjustment the health of the child suffers. The author gives a brief résumé of researches

upon the effects of school life on growth, nutrition, composition of the blood, and respiration.

LEWIS M. TERMAN. *Recent Literature on Juvenile Suicides*. Reprinted from the *Journal of Abnormal Psychology*, April-May, 1914. Pp. 8.

A résumé of recent statistics of school suicides in Europe, and a discussion of the significance of these statistics for the planning of school work.

F. V. THOMPSON. *Commercial Education in Public Secondary Schools*. Yonkers: World Book Co., 1915. Pp. xii, 194. \$1.50.

This number of the School Efficiency Series gives an excellent account of present conditions in commercial education, of the organization of typical schools, of the training and fitness of teachers, of the relation of the general high school to commercial education; gives an abstract of three investigations regarding commercial education, and offers some constructive proposals in regard to commercial high schools and commercial work in high schools.

H. D. VINCENT. *Vocational Arithmetic*. Boston: Houghton Mifflin Company, 1914. Pp. 126.

It is the aim of this book to arouse the pupil's interest by using material derived from the life of the community about him. Not only will the pupil learn to solve practical arithmetical problems, but through these problems he will gain a greater familiarity with the actual work that is going on around him. With each lesson there is a list of words for spelling and defining, and a number of business exercises involving letter-writing and bookkeeping.

HELEN THOMPSON WOOLLEY AND CHARLOTTE RUST FISCHER. *Mental and Physical Measurements of Working Children*. Studies from the Laboratory of the Vocational Bureau, Cincinnati, O. Psychological Monographs, No. 77. December, 1914. Pp. 227.

An examination of over 800 children in the following tests: height, weight, visual and auditory acuity, vital capacity, strength and steadiness of hand, rapidity of movement (tapping test), card-sorting test, cancellation test, memory and substitution tests, completion of sentences, association of opposites, puzzle-box test. Detailed tables and graphs of the results in each of these tests are presented, and the findings are correlated with school grades. The order in which the mental tests correlate with school grades is as follows: memory has the highest positive correlation; then comes association by opposites, the sentence test, substitution, cancellation, and last of all the puzzle box. The monograph closes with a consideration of the vocational corollaries that may be drawn from the study.

THE JOURNAL OF EDUCATIONAL PSYCHOLOGY

A TEST OF THE ABILITY OF CHILDREN TO USE LANGUAGE FORMS.

FRANCES JENKINS,

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In the year 1910-11 the teachers of our city were working intensively on the questions involved in the teaching of English. One of the most puzzling problems related to standards in written English, the degree of accomplishment which might reasonably be expected of children in the various grades. This was before the publication of the Hillegas scale in English composition, so suggestive in its combination of grading content and form. Our teachers had had no experience with standard tests of any kind. Grade meetings were held in which we discussed the essentials of children's composition work: the need for worthy thought, clearness of expression, fitting and even beautiful diction; the complexity of language form, the false standards of perfection set up by our general public, the crying need for teachers to know what it is fair to expect. So the way was paved for the intelligent co-operation of the teachers in developing some standard tests.

Two types of tests were developed and given, one planned to measure children's ability in original composition, the other to measure their power over language forms. The first proved difficult to tabulate, though we gained some very suggestive helps in method from its use. It has not been repeated. The second proved to have many values, and has been

repeated twice. The tests were given to pupils of grades V to VIII, 1911, 1912, 1914, at Decatur, Illinois. They were planned and given and the results tabulated under the direction of the supervisor of elementary grades, with much stimulating advice and encouragement from the superintendent and much practical help from the general supply teacher. The co-operation of the grade teachers in grading the papers, in studying the results and in making practical use of the information gained through the tests was the most important phase of the work.

The final test of a pupil's control of language forms must be his use of such forms in the expression of his own worthy thoughts, under the stimulus of an adequate motive. Nevertheless, there is a place for the specific testing of this control. The problem was to present a written lesson in which conditions might duplicate so far as possible those conditions which are present during the process of original composition. The dictation of a familiar fable was chosen as containing many elements which are present during this process. The influence of context, the attitude of expectancy, the sense of completeness were all, in some measure, provided for. The natural repetition of words and phrases, the relation of question and answer, the movement toward a climax found in the fable are all conditions of original composition.

The fable was so worded as to present easy sentences and difficult sentences, to use the various marks of punctuation required in our course of study, to use some homonyms, contractions and words giving peculiar difficulty in our own local community.

THE FOX AND THE CAT

A	B
One day a sly old fox met a modest cat.	The cat's fur was soft, her eyes
were bright, and her movements were slow and careful.	
C	
"How do you do, Mr. Fox?" said the cat.	
D	E
"Very well," replied the fox.	"Tell me, Mrs. Cat, how many tricks you
know for escaping from the dogs."	
F	G
"I know but one," answered she.	"I scramble up a tree as fast as I can."

H "Is that all?" said the fox. I "I know at least a hundred."

J "Hark! What's that noise?" said the cat. K As they turned to look, some dogs came running toward them.

L "Good-by," the cat cried, and she ran quickly up a tree.

M The fox, who had boasted too soon, tried all his tricks. N In spite of them all, O however, the dogs caught him and dragged him away. P As they hurried off the cat called, "Good-by, Mr. Fox. I am glad that I know one trick well."

In all cases the test was given by the supervisor of elementary grades or her assistant, the general supply teacher, two weeks of steady work being required to cover the city. Upon reaching a building a brief conference was held with the teachers, in which the purpose of the test was explained, a program arranged for visiting the various rooms, directions given for having papers and pencils in readiness and bulletins distributed explaining how to grade the papers.

Upon entering a room we told the class briefly what was to be tested, assuring them that steady rather than rapid work was desired, and that they would have time to correct their papers. A short sentence was read but once. A long sentence was read twice, once as a whole, then in parts. At the middle of the dictation and again at the end three minutes were allowed for the making of corrections, pupils drawing the pencil through errors and writing the correction above the line. After the papers were collected a three-minute lesson was given upon some point which seemed to need emphasis. The supervisor made a random selection of names from the register, the teacher grading and sending to the office the papers of the children chosen. Each teacher corrected six papers for each half-year grade. Results were tabulated and bulletins prepared for the teachers by the supervisor, with the help of the office force.

Three points were graded: (a) The number of words misspelled; (b) the number of words wrongly used; (c) the sentences written correctly. Our experience had shown us the need of separating misspelled words, in which the child confuses letters, from the wrong use of words, in which the child

substitutes another word for the one required, as then for when, run for ran, homonyms, singular form for plural, etc. Any word which is a legitimate word, but which does not belong in the context, is graded under (b). The correct sentence as a measuring unit was used with some hesitancy, but it has proven to be one of the most valued discoveries made by the tests. A sentence is graded as correct when spelling, punctuation, capitalization and construction are all correct. A difficulty arose in considering the possible variations in punctuation allowable according to different authorities. It seemed best to grade rigidly according to the form sent out from the office. Teachers and pupils understood, however, that other forms would have been counted as correct except for this purpose of exact comparison of results; thus the real results were in many cases higher than the test shows. In our daily practice any sentence is graded as correct if any good authority upholds the punctuation and capitalization employed.

DIRECTIONS FOR GRADING PAPERS

Mark each word used wrong W. Mark each misspelled word S. Wherever a punctuation mark is omitted or used wrong, mark P. Accept children's corrections in marking sentences perfect. The tests will be graded by comparison with the accompanying form, though it is recognized that in certain places other forms of punctuation would be legitimate.

Name of pupil	No. of words misspelled	No. of words used wrong	Correct sentences. (Record each by letter)

Accompanying this bulletin are papers for each teacher containing directions for examining the language papers of the recent test. This bulletin is designed to supplement and explain these directions. Telephone the office if any point is not clear.

1. Please follow the order of work given on this sheet; there are special reasons for using this order. Note especially that in the answers to certain questions the *number* of misspelled words and *number* of words used wrong are asked for, while the other questions call for *figures* and *letters* answering

the question *what*. Study the directions carefully before attempting to grade papers. Be sure that you understand the plan.

2. Every correction made by a child is to be counted in his favor; *i. e.*, a sentence is considered correct when a pupil has left it in correct form; his crossing out of a misspelled word does not count against him if he has rewritten the word correctly. Give him the benefit of the doubt in questions of legibility also.

A detailed study of the errors in punctuation was also called for and tabulated at the office. It was too difficult, however, and has never been required since. We were able from this study to tell which punctuation marks had reached the habit stage of control, which the pupils were beginning to control and those in whose use they failed. With the exception of a drop in 6B, and another in 8A, a steady gain in control was shown.

The results of the test were sent to the teachers, with notes as to their interpretation. The standing of her class was made known to each teacher, and to her alone. Emphasis was laid upon the growth shown in the years covered. Teachers in intermediate grades need to see that their steady work tells a little later. Many teachers asked for conferences regarding their language teaching. Specific needs could frequently be shown by referring to the test papers. Perhaps one of the best results was the opening of the eyes of teachers to the great complexity of written English, the need for patience and optimism in helping pupils to master it. The grading of papers according to the number of sentences written correctly, thus in an economical way emphasizing positive accomplishment, soon became an established custom throughout the schools. Personally, I consider this the most helpful single result of the test.

RESULTS OF LANGUAGE TEST, 1911

Grade	A			B			C		
	1	2	3	1	2	3	1	2	3
4B.....	86.1	14.35	43-155	20.9	3.45	4-57	1.2	.2	0-5
4A.....	57.07	9.51	29-129	14.23	2.37	9-28	7.23	1.2	2-22
5B.....	64.3	10.71	35-114	22.3	3.71	10-47	9.2	1.53	1-20
5A.....	44.72	7.45	33-78	27.2	4.53	5-63	15.54	2.59	9-26
6B.....	49.92	8.32	14-156	17.46	2.91	3-42	12.46	2.07	4-29
6A.....	27.45	4.57	4-90	13.18	2.19	1-42	16.54	2.75	5-32
7B.....	19.0	3.16	2-45	11.11	1.85	0-30	16.55	2.75	8-30
7A.....	9.11	1.51	2-17	6.37	1.06	1-12	29.0	4.83	21-56
8B.....	....	1.88	....	....	1.85	....	....	3.07	....
8A.....	....	1.94	....	....	2.11	....	....	3.11	....

A. Words misspelled.

B. Words used wrong.

C. Sentences correctly written.

1. Average number per class.

2. Average number per pupil.

3. Range from best to worst by classes.

NOTE.—The grading sheets of two strong classes, one fourth, one fifth, were lost in the office. They would undoubtedly have raised the averages of those grades somewhat.

The original test was repeated in 1912. We had found the work so difficult for fourth grades that it did not seem wise to repeat it in those grades. Otherwise the conditions of giving the test were the same as in 1911. The third sentence in the dictation was counted as correct whether an interrogation mark or a comma was used at the end of the quotation. This may have caused a slight gain in results to be apparent. Justice to the 7B and 7A grades compels me to attribute their low grades to an especially incompetent teacher.

AVERAGES IN LANGUAGE TESTS, 1911-12

A—Average number of misspelled words per pupil.

B—Average number of words used wrongly per pupil.

C—Average number of correct sentences per pupil.

Gains are shown by underlining.

		1911	1912			1911	1912
5B.	A.....	10.71	10.91	7B.	A.....	3.16	6.11
	B.....	3.71	4.39		B.....	1.85	2.61
	C.....	1.53	<u>2.95</u>		C.....	4.83	4.5
5A.	A.....	7.45	8.28	7A.	A.....	1.51	4.0
	B.....	4.53	3.56		B.....	1.06	1.4
	C.....	2.59	<u>3.13</u>		C.....	2.75	.9
6B.	A.....	8.32	<u>6.94</u>	8B.	A.....	1.88	1.1
	B.....	2.91	3.15		B.....	1.85	<u>2.0</u>
	C.....	2.07	<u>2.87</u>		C.....	3.07	<u>4.4</u>
6A.	A.....	4.57	4.72	8A.	A.....	1.94	<u>1.6</u>
	B.....	2.19	3.76		B.....	2.11	<u>.9</u>
	C.....	2.75	<u>4.52</u>		C.....	3.11	<u>6.3</u>

A study of these results shows the following interesting points:

I. Comparison of each grade in 1912 with the corresponding grade in 1911, 6B with 6B, etc.

In spelling the average per pupil has been raised in 6B, 8B, 8A.

In use of words the average per pupil has been raised in 5A, 8A.

In writing correct sentences the average per pupil has been raised in 5B, 5A, 6B, 6A, 8B, 8A.

II. Comparison of each class in 1912 with its own score in 1911, 5B with 4B, etc. (not including grades 7 and 8, which are in our departmental school and cannot be traced):

Twenty-seven classes have improved their records in from one to three of the lines graded.

Fourteen classes have lost in one line, one of these in two lines.

Nine classes which in 1911 were above the average in writing sentences correctly remain above the average in 1912.

THE ARAB AND THE CAMEL

A

One cold night an Arab sat comfortably in his tent. A camel put his head under the side of the tent, looked at the Arab, and finally spoke.

C

"It is cold, Mr. Arab," he said. "Pray let me put my head within your tent."

E

"Yes, indeed!" replied the Arab.

F

"May I warm my neck, too?" asked the camel.

G

"Yes," replied the Arab, and the camel's neck soon stretched across the tent.

H

"It will take but little more room if I put my fore legs within," said the camel. "It's difficult to stand this way."

J

"You may put in your fore legs," said the Arab. As he spoke he moved to make room, for the tent was very small.

L

"May I not stand entirely within?" begged the camel.

M

"Yes, yes!" was the reply. "I have great pity for you."

O

As soon as the camel had his whole body inside the tent, he pushed the Arab

P
outside. While he stood shivering, the camel called, "Good-by, Mr. Arab.
Q
Next time beware of the camel's nose."

For the repetition of the test in 1914 another fable was prepared, duplicating so far as possible the easy and difficult points presented by the first fable. The words Arab and camel used in this test proved to be a stumbling-block. Their constant recurrence in the fable meant a high percentage of error for those pupils who found them difficult. Compared with fox and cat, the corresponding words in the first fable, the difference in difficulty is clearly shown. Ease of grading necessitates counting the word as misspelled each time it occurs, counting as incorrect each sentence in which it is misspelled. This may serve to impress upon teachers and pupils the relative importance of words in a composition, a word which recurs frequently causing a higher percentage of error than one which is used only once or twice. It needs to be understood in estimating the results of our 1914 test, however, as some general cause evidently was present to lower the averages in that year. The English work of the city was on a better basis than ever before.

AVERAGES IN LANGUAGE TESTS, 1914

A—Average number of misspelled words per pupil.
B—Average number of words used wrongly per pupil.
C—Average number of correct sentences per pupil.
Gains shown by underlining.

	A	B	C
5B	14.6	<u>2.7</u>	1.6
5A	11.5	<u>3.3</u>	2.1
6B	10.1	<u>3.6</u>	2.1
6A	9.0	<u>3.5</u>	4.1
7B	<u>4.8</u>	<u>3.0</u>	4.5
7A	<u>3.2</u>	3.5	<u>3.5</u>
8B	<u>0</u>	3.3	3.0
8A	<u>1.7</u>	1.0	<u>12.6</u>

Comparisons with the earlier tests are discouraging because of the losses evident in each grade. The only comparison not affected by the words Arab and camel is under B, average number of words used wrongly per pupil. Here we

find slight gains in three of the grades, 5B, 5A, 6A; slight losses in five, 6B, 7B, 7A, 8B, 8A.

The same steady growth in spelling ability through the grades is shown as in the 1911 and 1912 tests. Except for the drop in 7A, 8B and the decided rise in 8A, there is a steady growth in writing correct sentences. I attribute the drop in 7A, 8B to the fact that the introduction of formal grammar in those grades decreases the time spent upon written composition. There may be other causes. The composition work in 8A is more intensive in character, which may account for the rise there.

The gains from the use of these tests have been very evident. Teachers judge their results more in the light of their relation to other grades and other years—there is less danger from overattention to formal detail. Teachers diagnose the needs of their classes more intelligently, attacking difficulties of form mastery when they are most needed. Teachers recognize more clearly the influence of maturity in giving mastery over the great complexity of formal written English. Teachers realize the value of bringing mastery of a specific form to the habit stage when that form is needed by the pupils. Economical methods of accomplishing this form mastery have been developed. Moreover, the work on form has been subordinated to the thought side of language teaching. Many of the classes making highest grades in the tests have been those whose teachers best understood motivating the English work, using variety in methods of attack, pushing to worthy results. The insight into scientific method gained by the teachers through actually participating in this work has been of great value.

Certain opportunities came to the supervisor from giving the tests. I was able to come into close touch with the organization of buildings, the responsiveness of classes, the writing habits of pupils. The measuring of class with class enabled me to suggest the need for drill in some classes, for greater freedom and originality in others. The dictation lesson was presented as a model lesson, in many instances giving the teacher an entirely new idea of a dictation lesson. Incidentally we discovered that such an exercise should be

much simpler than the exercises usually presented in the language texts. Best of all was the opportunity for co-operation with the teaching force in a problem which is puzzling the educational world and whose solution, or partial solution, is worth while.

Peter Sandiford

SILENT VERSUS ORAL READING WITH ONE HUNDRED SIXTH-GRADE CHILDREN.

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It is not at all uncommon to enter a schoolroom and hear what the "layman" would call excellent reading on the part of the pupils. The author lately visited a class in English for foreign children and heard them glibly pronounce the words of a Greek myth. When asked to tell in their own words what the paragraph meant to them, not a single one had an idea, yet the teacher had accepted their efforts as "good reading."

What is the purpose of reading? Is it to pronounce and express orally the printed word? This is only the smaller part. The getting of the thought which the writer wishes to express is the main purpose for our reading. Do we as adults attack our evening paper, magazine or story-book by the oral method? Probably 99 per cent. of our reading in after life is done silently. Why do so many of our teachers insist on spending this same per cent. of time on oral reading with their classes? They may claim it is to train the pupil in expression, enunciation, and the like. Let this be done, then, by oral composition. A mechanical pronouncing of every word on the printed page may form in the child habits of articulation that will carry over into his later silent reading and cause him to become a slow reader. The author feels this from his own experience.

If we admit that thought-getting is the primary purpose of reading in adult life, and we must so admit, by which method, oral or silent, can we glean the greatest number of points? If in the same time limit we read more lines silently than orally, we would probably remember more points; but do we remember a greater percentage of possible points when material is read silently than when it is read orally? In a test

with 23 fourth-grade children Professor Pintner's findings in the June, 1913, *JOURNAL OF EDUCATIONAL PSYCHOLOGY* would point to the affirmative side. In the same spirit of inquiry the author had several members of his seminar¹ test five different groups of sixth-grade children in oral versus silent reading.

The material consisted of stories from "Alice in Wonderland" in a 32-page pamphlet form. The lines were numbered, and agreement was made as to the number of points given each line or paragraph. Each teacher had a similarly marked key book. Six tests of two minutes each were given to the children of five different sixth grades by each method, silent and oral. In the silent tests the children were taken each time as a group. They were each supplied with a copy of the stories. No pupil had recently read any part of the stories, and as far as could be ascertained, not one was familiar enough with any of them to cause his elimination from the tests. The following directions were given:

"1. Open your book at page—— and turn it face down on your desk. At the signal 'Get ready' (which was given five seconds before the minute), take hold of the booklet ready to turn, but do not turn until I tell you.

"2. When I say 'Begin reading,' you are to turn and read silently, beginning at the place marked. (To avoid confusion, the teacher was to hold the booklet up before the class a moment to show them where the mark was placed.)

"3. When I say 'Stop,' place your finger on the last word read and quickly draw a circle around this last word, and then close the book immediately. (The time limit was two minutes.)

"4. You are then to write all you can remember of what you have read. When you are sure you have finished, you are to raise your hand and your paper will be collected." (Children were given what time they needed.)

The books were collected each time and entry made as to the number of lines covered by each pupil. At the beginning of the next test the teacher read to the class the story between

¹The following teachers of the Cincinnati schools: Miss Isabel Sears, Miss Lottie Wiedemer, Mr. Elmer Haehnle, Mr. Charles Rounds and Mr. E. C. VanWinkle.

the points of the slowest and most rapid reader of the previous test. This latter place had been marked by the teacher in each booklet, and it furnished the place to begin on the following test. Enough was read by the teacher to make the beginning each time at a new paragraph. The papers of each pupil were scored as to number of points reproduced. In the six oral tests the pupils were heard separately, the number of lines being noted by the teacher. The children wrote immediately, however, in an adjoining room what they remembered.

TABLE I.

		Silent.				Oral.					
		Average age, years.	Average No. lines read.	Average No. points reproduced.	Per cent. of points reproduced of points read.	Average No. lines read.	Average No. points reproduced.	Per cent. of points reproduced of points read.	Per cent. difference (oral as base.)		
No.									Total.	Average.	
Class I.	20	13.0	39.6	10.5	25.22	33.9	9.2	25.12	+	2.0	+.10
M. V. ....		.9	9.7	2.7	6.6	4.8	2.4	6.2			
Class II.	24	13.0	47.7	25.2	48.6	39.6	20.7	47.3	+	31.0	+ 1.30
M. V. ....		.6	12.1	9.3	11.9	5.6	6.3	13.4			
Class III.	20	11.9	51.6	17.2	29.9	39.1	11.6	27.3	+	54.1	+ 2.70
M. V. ....		.6	8.7	4.4	7.5	5.9	3.5	6.8			
Class IV.	24	12.4	30.7	16.3	48.2	25.4	10.4	39.8	+	214.3	+ 8.93
M. V. ....		.7	6.7	2.8	9.2	5.9	2.4	8.7			
Class V.	24	12.2	27.4	11.2	41.6	30.2	8.4	25.1	+	401.0	+ 16.70
M. V. ....		.8	9.6	2.3	10.7	5.6	1.9	4.5			

Table I gives the averages by classes, with the mean variation in each instance. The six attempts of each pupil by each of the two methods were averaged. The class average is derived from these. The per cent. of difference between the two methods, using the oral as a base, shows in the last two columns. The plus sign means the silent method gave the better results. The record of Class II, for example, could be read as follows: There were 24 pupils with an average age of 13.0 years, mean variation .6 year. This class, by the silent method, read an average of 47.7 lines. Of all the points, the class made an average reproduction of 25.2 points. This was 48.6 per cent. of the total possible points. The record for the oral attempts is read in the same manner.

With one exception, Class V, each class read a greater number of lines silently than orally. Without exception, each class reproduced a greater percentage of possible points by the silent method of reading than by the oral method. This varied from .1 per cent. for each pupil of Class I to 16.7 per cent. for each pupil of Class V. Of 112 pupils of the sixth grade, 80 did better silently than orally, while 2 did equally as well by either method. From the results with these five classes we are more convinced than ever that our schools devote altogether too much time to oral reading and too little to silent. Not only does the pupil as a rule show us he can gather more thoughts by the silent method than by the oral, but by too much oral work we are fixing bad habits of articulation which will prove a hindrance in after life when it comes to silent reading. Teach the child the method he is to employ in adult life, and we conform to the very best theory (the neurone theory of the brain and its separate connections) in educational psychology today.

Qualifying Factors in the Test.

In favor of oral:

The silent tests were given first. This might have the result that—

(a) Practice effect would show more in the oral attempts which came last.

(b) Maturity entered; from two to four weeks later. The customary method of every-day school reading was oral.

In favor of silent:

There was a more disturbing element or unnatural setting in the oral than in the silent series. The pupils were taken singly into the hall or dressing-room.

The novelty was less in the oral series.

FORM AND POSITION IN HANDWRITING INTERPRETATION. PART II.

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(Concluded from the May number.)

3. THE PAIRING OF HANDS.

Method. The first test upon the pairing of hands was carried on as follows: Sixteen pairs were selected from envelopes received in correspondence by one of the writers of this paper. The first set of 16 were cut from their backs, but otherwise were unchanged; the second set were cut into small oblongs so as to remove all postmarks and other means of artificial identification. It was not possible to procure envelopes absolutely consistent in form of address; care, however, was taken to include no pairs which corresponded in any form of peculiarity. From five to nine words appeared in the address. In one or two instances the specimens used had been received at a long interval of time apart. In the case of one sample this time-discrepancy introduced some difficulty in identification, since details of the writing had varied, although the individuality was unchanged.

The test proceeded as follows: The reagent was told by the experimenter, "Here is a set of envelopes addressed to me; here is a second set of addresses; for every specimen of writing in the first set there is a mate in the second. You are to find, that is, the addresses written by the same person. Do you understand? All right, begin." A few of the reagents questioned whether they should pay attention to the form of the address, whether the handwriting had been disguised, and the like. They were told that the handwriting alone, not the form of address, was important, and that the envelopes had been received in correspondence. As the reagent began ma-

nipulating the slips, a stop-watch was started by the experimenter.

The experimenter noted the time spent in preliminary manipulation by each reagent and also recorded a description of the method utilized in pairing slips. As no instruction had been given as to the method of manipulation, some characteristic differences resulted. The time of manipulation was, however, short relatively to the total time. The main difficulty resulting from difference in manipulation was that various slips got differently placed with reference to the field of vision, although, of course, all slips were numbered and were given to each reagent in the same order, and that certain reagents exhibited such bad technique as to put them at a disadvantage in comparison with their more orderly co-subjects.

Results. A general survey of the results from some 40 reagents shows a surprising difference in the capacity of individuals to identify or match handwriting. Certain reagents remarked during the course of the experiment their inability to recognize the handwriting of their correspondents; one is unable to distinguish the writing of her adult children from whom she receives weekly letters. The difference in time needed for pairing the addresses with the percentages of accurate pairs ranged from the time of the reagent who paired the envelopes in 7 min. 25 sec. with 100 per cent. accuracy to the reagent who took 22 min. 39 sec. with only 50 per cent. accuracy or the one who in 35 min. obtained an accuracy of only 56.2 per cent.

These figures were obtained before the publication by Osborn of a summary report upon a somewhat similar test, with the emphasis upon the practical significance of the results in connection with court procedure where witnesses are called upon to testify concerning handwriting or judges have need to pass upon such evidence. Osborn ascribes failures in the matching of handwriting to "form-blindness." In the tests which were carried out for him by Professor Jastrow—who, we are told, is to make a complete report—the skill of subjects of "approximately the same age and ability ranged from 100 per cent. accuracy in 8 min. and 35 sec. to 60 per cent. of error in 9 min. and 55 sec. Another subject shows

30 per cent. of error in 15 min. and 40 sec." ⁷ The test reported varied from that just described in that the reagent was given 40 samples of the one written word "New York" and asked to pair them. There was no separation into two series. Such procedure involves a chance for a greater number of errors, although one word is a material more easily manipulated than is an address.

It might be conjectured that experience in dealing with handwriting is of first importance in developing skill in its identification. Undoubtedly, as will be shown, practice effects appear. None the less, there is evidence of a curious difference in the natural propensity of different individuals to see handwriting likeness (or difference) which at once raises the question of the mental trait or traits involved. Of the 40 reagents tested, 28 were college students; 12 were adults considerably older, the majority of whom were college graduates, and a number were instructors in college. On the face of it, the second group had the advantage in experience. Yet the best record among the older group—that of a bank cashier who made a record of 87.5 per cent. accuracy in 14 minutes—was excelled by that of nine undergraduates. Another of the older group had been a teacher of commercial subjects, including penmanship, for many years. He was most unskilful in identification, giving only 43.7 per cent. accuracy in 14 minutes. None the less, as he informed us, since he is an expert handwriter, he has, on occasion, been called into court to testify as a handwriting expert! And, indeed, as the history of handwriting expertness shows, the teacher of penmanship was one of the first accredited experts. Of the college students who made particularly good records, only one, who had previously held a position as mail-clerk, had had particular experience in dealing with handwriting; this subject took third rank among the 40 reagents.

Besides the two groups described above, a group of nine children was tested in order to determine whether such striking individual differences would be found to occur among them. A tabular summary (Table IV) is given which suggests at once some interesting questions. Very evidently,

⁷OSBORN, A. S. "*Form-Blindness.*" Case and Comment, Vol. 19, p. 806.

while the children on the whole handle the situation inadequately, there are one or two among them (Lst and Lho) quite as good as a number of adults. Again we raise the question as to the traits concerned.

TABLE IV.

Reagent.	Age. ⁸	Time.	Per cent. accuracy.	Remarks.
Jdu	8-3	16'	18.7	Concentrated on minute details. Noticed all manner of discrepancies in the address, etc.
Fco	9-8	16'	25.0	
Lst	10-7	15'	68.7	Very careful and systematic. Found the test highly entertaining.
Cjo	10-8	19'	25.0	Motor mimicry utilized. Reacted with curious grimaces and attitudes. No details noticed.
Csp	10-10	22' 20"	31.2	Very deliberate. Made careful inter-comparisons.
Ast	10-11	20'	37.5	Before revision Ast gave 43.7% accuracy in 14' 40".
Hgr	11-1	22' 35"	31.2	Very deliberate and thoughtful; made detailed comparisons; grew fatigued and confused toward close and shifted pairs. Before shifts had 43.7% accuracy.
Lho	11-2	14' 30"	81.2	Remarkable efficiency.
Cbr	12-2	6' 15"	18.7	Careless and indifferent. Attention not sustained.

In the case of all groups very great individual differences occurred in the way in which the reagent handled the problem. There may occur, for example, a rapid pairing of hands, based upon a general impression of likeness (or difference), or a slow matching after a labored comparison of details. The problem may also be handled in a negative way—that is, by successive elimination of hands that do *not* match. Often a reagent became hopelessly entangled in the observation of minute differences without showing any perception of the very striking characteristics of the writing as a whole. At times there would occur, as certain subjects reported, a complete loss of a sense of likeness, so that correct matches previously made would become unsatisfactory. One reagent in particular, who had succeeded in pairing the whole series without an error, said at the close of the experiment: "Not a single pair now is satisfactory, although I saw a likeness

⁸In years and months.

when I made the pairing." Very evidently fatigue and general bodily condition affected the outcome. A matter of mental set or attitude seemed also to be involved.

The experimenter reached two provisional conclusions: (1) that there exists a natural inclination to concentrate on general likeness or on detailed differences, an inclination evident in the behavior of children as well as in that of adults, since Jdu at 8 years and Csp at 10 (both unusually clever children) showed as strong a preoccupation with details as did certain of the adults; and (2) that such preoccupation with details was unfavorable to the perception of likeness and hence to success in the matching of hands. Later work caused a modification of these opinions, in that it appeared that there may be a perception of difference as impressionistic and as successful as the perception of likeness. In any case, there appeared to be evidence of a curious tendency to concentrate on the whole or on details.

If we turn now from the reagents to the material utilized we find a great difference in the ease with which certain specimens of handwriting could be identified. Certain hands are much more conventional than others. A careful tabulation was made of the number and nature of errors made by the reagents on each pair. These errors ranged in number from 3 on one slip to 19 on another. Cases of exchange were also tabulated, cases, that is, where a double error was consistently made. Certain reagents made no errors save those errors of exchange, a sort of error which seemed to indicate an actual resemblance between the hands exchanged.

Besides the test on the matching of addresses, a series was tried in which the pairing of single words was desired. The word "Laramie" was cut from 32 addresses and pasted for one series of 16 upon oblongs of smooth paper and for the other series of 16 (duplicates) upon oblongs of rough paper. The test was carried on under the instructions and conditions described above, but on a smaller number of reagents. In some cases the words were paired before the addresses, and in other cases immediately after the pairing of addresses. The results (speed and accuracy of performance) and the introspective records show that, in general, the matching of

single words is a very much simpler matter than the matching of addresses. Various reasons are given for this, namely, ease of fixation, possibility of complete intercomparison of letter-forms, etc. The results justify the custom of the expert who resorts to devices for making possible a word by word and letter by letter comparison of a disputed writing with a probable original.

In striking contrast to the majority, a few reagents find the word-test more difficult than the address-test, because, as they report, there is so much less to see! One reagent (Msm) dropped from 75 per cent. accuracy in 5 minutes in the pairing of addresses to only 31.2 per cent. in 6 minutes in pairing words, the latter test being given immediately after the former. Apparently, such a reagent is relying, to a high degree, upon an impressionistic judgment. For the experimenter the address test seems so much the simpler that the outcome was quite contrary to her expectations. The resemblances between the proper pairs of addresses are, for her, so clear-cut and unmistakeable that failures to match are incomprehensible. The resemblance between word-pairs are noticeably less pronounced. Evidently, such is not the usual experience.

That a great shift in conditions occurs in the second test—and that an interesting problem is suggested for investigation—is shown by the fact that the coefficient of correlation between the two tests, when the word-test is tried just after the address, is for 12 reagents only .218.

In order to get a reliability coefficient for the pairing of addresses, a second test of the same kind was tried. Ten pairs of addresses were utilized. To avoid differences in manipulation (time and place) errors, the experimenter, before the test began, placed the first series of addresses on the table in a definite order. This set was so selected that exactly the same five words appeared on each sample. These five words were cut out and pasted upon fairly large sheets of paper. The duplicates were cut into small oblongs as before.

Unfortunately, a fault in procedure made it impossible to utilize results from the whole group of 16 reagents. During the interval between the first and second pairing of addresses,

12 of the group^o had served as subjects in a test involving the arranging of hands according to their likeness to or difference from a given model. A very considerable practice effect was evident on the repetition of the matching test. The increased rapidity of reaction was noteworthy. Six of the 12 practiced reagents completed the second series in less than 2 minutes; five reagents gave an accuracy of 100 per cent. in less than 2 minutes and 30 seconds. Ssh matched the 10 addresses in 1 minute and 17 seconds without an error, although in the preceding test he had consumed 16 minutes and 39 seconds and made four mistakes. Gab shifts from 10 errors in 14 minutes 33 seconds to 2 errors in 1 minute 11 seconds; Lth from 6 errors in 30 minutes 8 seconds to 2 errors in 2 minutes 8 seconds. The practice effect was, of course, more pronounced in the case of the reagents who were most inefficient in the first test. Furthermore, the amount of time spent on the likeness-difference test varied enormously with individuals, so that the amount of practice in dealing with writing varied for the different subjects. For these reasons it is not surprising that the coefficient of correlation for the two tests in matching addresses was for the 12 reagents low—only .469.

4. THE RELATION OF SPEED AND ACCURACY.

With regard to the relation of speed and accuracy to the final rankings in these tests, we can do little more at present than give the facts observed. The question of the proper weight to be given to speed of performance in various tests has been debated by several writers with varying conclusions. It is no doubt true, as certain writers have emphasized, that relative speed may be indicative of certain types of reaction, but is no index of quality of reaction; it is also true that emphasis upon speed may have a bad emotional effect upon nervous reagents. Yet surely speed cannot be wholly discounted. If two reagents carry out the same bit of work with equal accuracy, but one of them in half the time that the other takes, we have an individual difference of great practical signifi-

^oThese reagents were chosen for the likeness-difference test because of certain characteristic reactions. The report on the outcome of this particular test is given elsewhere.

cance, and one which may be indicative of certain general tendencies.¹⁰

In the present tests speed was certainly significant. It was not, however, possible to make it the sole determinant in our ranking of subjects, since errors occurred which could have been corrected only by suggestions on the part of the experimenter. Moreover, both a setting of errors and a disinclination to continue work after a certain point was very noticeable on the part of certain reagents. Accordingly, it became necessary to reckon both with speed and error, so that for every test the question arose concerning the proper method of estimating errors and the method of equating time and errors.

We tried the effect of various methods of equating time and error. The method finally adopted was the simple one of ranking the reagents for time and error separately and then taking the average rank as the final one. By preliminary figuring we found that such a method gave results agreeing very closely with those obtained by a more laborious method of finding the value of each error in seconds and adding to the time record of each reagent so much per error. Thus we found that rankings by the two methods gave, in the first samples of illegible writing, a correlation coefficient of .982.

A few words with regard to the treatment of errors in the separate tests. The problem in regard to the mirror-reading was relatively simple, since, as stated above, in the first test 8 subjects read the sample correctly and in the second test 11. As shown in the section on mirror-reading, the three different ways of ranking for errors gave results that were almost equivalent.

In handling the results from the two Completion tests, the experimenter's interpretation of errors made a great difference in the resultant correlation between the two tests. The experimenter in these tests went over the results three times very carefully, ranking omissions as 1, meaningless substitutions as 2 and too short or too long words as $\frac{1}{2}$. He found

¹⁰In this connection a quotation from Simpson is relevant: "All of the Good group did the tests with a high regard for the value of time, while such a thing as the time element being of much significance or importance hardly dawned upon members of the Poor group, even though the instructions given were the same for both groups." *Loc. cit.* (p. 69).

that his correlations varied from .570 to .697, depending on his interpretation of errors.

In the illegible writing tests the same difficulty was encountered as in the completion tests. How shall an omission be evaluated in comparison with a meaningless substitution? What relation do both bear to a meaningful substitution that is too long or too short, or that seems but remotely suggested by the form of the writing? For the purposes of this experiment all mistakes, whether omissions or substitutions, were counted as 1. Here, as in the completion tests, the experimenter's interpretation of errors gives rise to great variation in resultant correlations between tests.

In the test on the pairing of hands, errors in matching handwriting could be simply numbered. Every error was counted as equivalent in value to every other. It is probable, however, that such an estimation of errors needs correction on the basis of frequency of error. Certain mistakes were made by so many reagents as to point to an objective resemblance of some sort. Moreover, as has been said before, errors of exchange seemed to be somewhat less significant than other errors. All errors were, however, put on the same level in getting the final ranks.

In order to see if there was any constant relation between rapidity of manipulation in the tests and accuracy, the average was obtained for each subject of his rankings in all the tests separately for time and error, and the average ranking for time correlated with the average ranking for error. The coefficient of correlation amounts to only .308, not high enough to warrant definite conclusions, further than that there may be a slight correlation between rapidity and accuracy.

5. GENERAL CONCLUSIONS.

Let us bring together the results obtained in the present series of tests and attempt to determine how far we are justified in answering the question put in the introduction as to the amount of correlation between the ability to interpret variations in relative position of letter-parts and variations in form with the possibility that such correlation is low or, even, negative.

Let us notice, in the first place, that the coefficients of reliability are low, except for the mirror-reading test, as fol-

lows: for mirror-reading, .69; for the reading of illegible writing (A 1 and B 1), .552; for the pairing of hands (12 reagents, unequally practiced), .469.

Furthermore, we must consider the extent to which meaning (context) was utilized in the interpretation of both mirror-script and the illegible samples of writing. Table V gives us the coefficients of correlations for the two completion tests and the reading of each sample of illegible writing.

TABLE V.

Illegible writing.	Completion test.	
	I.	II.
A 1.....	.489	.325
A 2.....	.375	.405
B 1.....	.432	.082
B 2.....	.692	.545
C 1.....	.274	.303
C 2.....	.358	.072

The curious thing is that in four out of six pairs the correlation is higher with the mutilated than with the un mutilated specimen. The highest coefficients (high enough to be significant) occur in B 2, .692 and .545, a correlation as high in the first case as that between the two completion tests. The only interpretation possible is that the cutting of the key words in B 2 (a handwriting which proved to be readable without much difficulty) turned this test into a completion test. The reagent must have used meaning in making his transitions, although only in a few cases were words actually spoken aloud. The reading of sample C involved least dependence upon meaning.

The mirror-script test shows no evidence of correlation with the completion tests, Table VI, a point of interest in this connection when we recall Stern's conjecture that possibly there is an inverse relation holding between tendency to concentrate on meaning and indifference to position. The correlations of the mirror-reading with the completion tests are as follows:

TABLE VI.

Mirror-reading.	Completion test.	
	I.	II.
A.....	.283	.117
B.....	— .017	.082

It is evident that mirror-reading tests ability to deal with shifts in position more satisfactorily than the reading of illegible writing tests ability to deal with distorted form.

Again, we would emphasize the need of certain changes in the illegible writing so as to cut out the meaning factor and to present letters singly or in meaningless groups.

Keeping in mind the limitations of the illegible writing tests, we are now ready to ask for the relation between ability to read mirror-script and to read illegible writing. Table VII gives the correlational coefficients for the two samples of mirror-reading and the reading of the three samples of bad writing in both the mutilated and un mutilated form.

TABLE VII.

Illegible writing.	Mirror-reading.—	
	A.	B.
A 1.....	.360	.061
A 2.....	.049	.200
B 1.....	.348	.402
B 2.....	— .021	.075
C 1.....	.278	.248
C 2.....	.705	.470

These coefficients are low, except in the case of C 2 (.705 and .470). As we have previously seen, C 2 shows least correlation with meaning. We cannot determine, therefore, from the data at hand whether these results are to be interpreted as indicating a lack of correlation between ability to interpret form and ability to interpret position, or, rather, in view of the high correlation with C 2, as indicating merely an inverse relationship between a tendency to concentrate on meaning and on either visual form or position.

The illegible writing test and the matching of hands were utilized with the expectation that both would test form perception. Table VIII gives the correlation of every sample of writing with the results of the first test on pairing hands.

TABLE VIII.

Illegible writing.	Pairing handwritings.—	
	I.	II.
A 1.....	— .016	— .048
A 2.....	.118	— .322
B 1.....	.064	.120
B 2.....	.180	— .014
C 1.....	.278	— .264
C 2.....	.442	.035

Again the figures permit us to draw no conclusions, certainly not one of relationship between the two tests. Only

one coefficient (see C 2) is at all significant. The correlations with the mutilated script are consistently higher than with the un mutilated, but in view of the low coefficients throughout, this fact can point to no conclusion.

There is no evidence of correlation between ability in pairing hands and in mirror-reading as shown by Table IX.

TABLE IX.

Mirror-reading.	—Pairing handwritings.—	
	I.	II.
A.....	.294	.102
B.....	.152	— .088

There is no evidence of correlation between the completion test and the pairing of handwritings. Table X gives evidence of this.

TABLE X.

Completion test.	—Pairing handwritings.—	
	I.	II.
I.....	.395	.232
II.....	.181	.206

In general conclusion we may say that, although the results of the tests are inconclusive, there is some evidence that the mirror-test depends upon a specialized kind of ability. Whether or not such ability correlates with ability to see form cannot be determined, as our two supposed tests for form-perception failed to correlate. It is true that the reading of C 2 correlated with both the mirror-reading and the pairing of hands, a fact which might lead us to infer a relationship between the two tests, but the pairing of hands showed no correlation with mirror-reading. Obviously, the tests need to be analyzed more minutely before we shall know what mental traits are concerned and what capacities each tests.

TABLE XI.—General Correlational Coefficients.

	Mirror-Script.		Completion Test.		Illegible Writing Test.						Pairing Hands.
	A.	B.	I.	II.	A 1.	A 2.	B 1.	B 2.	C 1.	C 2.	
Mirror Script A.....	....	.697	.283	.117	.360	.049	.348	— .021	.278	.705	.294
B.....	.697	....	— .017	.082	.061	.200	.402	.075	.248	.470	.152
Completion Test I.....	.283	— .017	....	.621	.489	.375	.432	.692	.274	.358	.395
II.....	.117	.082	.621	....	.325	.405	.082	.545	.303	.072	.181
Illegible Writing A 1...	.360	.061	.489	.325	....	.420	.552	.650	.410	.456	— .016
A 2...	.049	.200	.375	.405	.420	....	.297	.479	.156	.126	.118
B 1...	.348	.402	.432	.082	.552	.297	....	.540	.186	.559	.064
B 2...	— .021	.075	.692	.545	.650	.479	.540	....	.347	.169	.186
C 1...	.278	.248	.274	.303	.410	.156	.186	.347	....	.465	.278
C 2...	.705	.470	.358	.072	.456	.126	.559	.169	.465	....	.442
Pairing Hands I.....	.294	.152	.395	.181	— .016	.118	.064	.150	.278	.442	....

HOW WELL MAY PUPILS BE PREPARED FOR HIGH SCHOOL WORK WITHOUT STUDYING ARITHMETIC, GRAMMAR, ETC., IN THE GRADES?

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The public elementary school serves largely as a preparatory school for the high school. This seems to be the dominant purpose, in spite of the fact that a very small portion of elementary school pupils become high school students. This purpose is seen in the attempt of schoolmen to "bridge the gap" between the two schools by such methods as the six-six plan of organization; the departmental system in the upper grades; the housing of upper grades in high school buildings. Stronger evidence of this preparatory character of the elementary school is seen in the treatment of arithmetic as a basis for algebra; English grammar as a foundation for foreign languages and high school English; history as an introduction to more advanced high school history. Preparation is undoubtedly made, even though high school teachers so frequently complain of the lack of preparation provided in the lower schools.

For some years I have been of the opinion that this preparatory function of the elementary school has been emphasized too much. In the work of the University Elementary School at the University of Missouri¹ emphasis is given to the immediate needs of the pupils rather than to preparation for high school work. To this end the pupils throughout the seven grades pursue four "studies":

1. Observation of nature and industrial activities.
2. Playing games of present interest.
3. Handwork: making things of immediate usefulness.
4. Enjoyment of stories, pictures, music.

Reading, writing, arithmetic and other such "common branches" are not taught as such at all. The content of such branches is *used* only as needed in one or more of the four studies constituting the curriculum of this school.

This does not mean that pupils in this school do not learn

¹See Educational Review for April, 1909, for statement as to this school, or write for illustrated booklet.

to "read, write or cipher." It does mean, however, that proficiency in these common school studies is made quite subordinate, as a purpose, to proficiency in "Observation," "Play," "Handwork" and "Enjoyment of Stories." Thus it might be rightly claimed that the work of this school should be measured, not in terms of school subjects, but in terms of the out-of-school activities of the pupils. But one of the cardinal principles of this school is: Preparation for later efficiency is acquired by being efficient in present activities. (Space forbids any discussion here of the limitations of this principle.) Thus, while preparation for high school work has been treated in this school as quite subordinate to another purpose, the assumption has been made that pupils trained in this school would prove equal to doing at least average work in the high school. This much may be rightly demanded by parents of children passing into the high schools. No more than this has been expected by those responsible for this school.

The University Elementary School is completing its tenth year. In September, 1905, 15 pupils were enrolled. Each year a small increase has been made. One hundred and twenty-three are enrolled this year. The total enrollment has reached 347. Seventy-five have been graduated, but not all of these had all their work in this school. Sixty-six of those who graduated have done work in nine different secondary schools. Thirty-eight have been students in the University High School; 31 in the Columbia High School (some students in both schools). Thus the number of cases possible for study is small, but may be sufficient to indicate a probable tendency.

The problem is simply this: How do students from the University Elementary School, where no formal work in the common branches is given, compare with the general average of students in the high school?

The grades E, S, M, I, F are used in the high schools here considered. I know of no high school where a serious effort is made to grade students according to the normal curve of distribution.

The table on Page 363 presents a summary of the distribution of grades and their corresponding percentages.

TABLE GIVING SUMMARY OF THE DISTRIBUTION OF GRADES AND THEIR PERCENTAGES.

	Grades.		Percentages.	
	E. S.	H. S.	E. S.	H. S.
E	52	103	14.4	7.5
S	98	268	27.0	19.5
M	168	815	46.4	59.3
I	41	163	11.3	11.9
F	3	25	0.9	1.8
	<hr/> 362	<hr/> 1374		

In the column *E. S.* are the grades made by students from the University Elementary School. In the column *H. S.* are the grades of students in the University High School during the last three semesters. This second group of grades is presented as a basis for comparison, inasmuch as the grades of this school are not in accordance with the normal curve of distribution. The two columns at the right show the percentages.

These figures readily indicate that the students from the University Elementary School rank well when compared with the standard throughout this high school. The percentage of E's is nearly twice that in the whole high school; the percentage of S's is nearly one-half again as much as in the whole high school; the percentage of I's is practically the same for both, but students from the University Elementary School make F's at only one-half the rate made throughout the school.

A table of distribution of grades for the various high school subjects (not presented here) shows comparatively little deviation from the figures given in this summary of grades.

Parents and elementary school pupils seem more concerned over English (especially the grammar) and arithmetic than other subjects by way of preparing for high school work. The indications are that pupils are safer in these two subjects than in the others, so far as high school standing is concerned.

The indications of the data referred to above are supported by data and method of a different sort. Since September, 1912, the students of each class in the University High School are arranged, at the close of each semester, in serial order according to rank. Students coming from the University Elementary School since that date have been noted as to whether above or below the median of the classes where they are members. Those above the median outnumber those be-

low. By measuring the aggregate distance above and below the median, it is shown that the median for this special group is above the median for the whole school, in all subjects taken together, and also in each subject alone, except German and history, where the medians fall only slightly below those for the whole school.

Pupils from the University Elementary School compare favorably with the standard maintained in the Columbia (City) High School as shown by the following distribution of grades by percentages:

	(U. E. S. Pupils in C. H. S.) Σ			(C. H. S. Pupils) M
	English	Mathematics	All Classes	All Classes
E.	0.0	4.4	1.7	1.9
S.	30.9	31.4	35.9	24.1
M.	51.4	46.3	46.6	41.5
I.	16.2	13.4	14.0	24.8
F.	1.4	4.4	1.7	7.7

These Elementary School pupils maintain the standard of the city high school in the E grades; they secure one-half again as many S's; they make only slightly more than one-fifth as many F's and a little more than one-half as many I's. The favorable standing in English and Mathematics is clearly indicated by the figures.

There might be a suspicion that the pupils in this University Elementary School are a select class, *e. g.*, children of University professors. Less than one-third of the school throughout the 10 years has been of this class. A comparison of their grades in the high school indicates a difference quite negligible. Other like considerations cannot be presented here, in so brief an article.

This is not a local problem. The formal subjects in the elementary schools are adversely criticized and are undergoing change. Yet parents and teachers are loath to give up the drill in the three R's on the ground that those subjects are prerequisite for successful high school work. But the great majority of elementary school pupils are destined not to enter the high school. These pupils should be taught the things that are of value to them, *viz.*: the practical things of every-day life. If it can be shown that such studies prepare those who do go further in school as well as the study of the "common branches," a change in the curriculum of our elementary schools would be advisable. The investigation referred to above supports this theory.

COMMUNICATIONS AND DISCUSSIONS.

A STUDY OF HIGH SCHOOL AND UNIVERSITY GRADES, WITH REFERENCE TO THEIR INTER-CORRELA- TIONS AND THE CAUSES OF ELIMINATION.¹

Contributions from the University of Texas Educational Laboratory, No. 7.

This investigation is founded upon the grades by 100 students, graduates of the Austin High School, who entered the University of Texas in the fall of 1911 or previously. The following grades, obtained from the high school and university records, were chosen for study:

H. S. E.—Grade received in English in the last year of the high school.

H. S. M.—Grade received in mathematics in the last year of the high school.

H. S. Av.—Average grade received in the last year of the high school.

Fr. E.—Grade received in English in the freshman year of the university. (Pupils attending the university one and a fraction years, but less than two years, are listed as freshmen.)

Fr. M.—Grade received in mathematics in the freshman year of the university.

Fr. Av.—Average grade received in the freshman year of the university.

So. Av.—Average grade received in the sophomore years of the university.

Jr. Av.—Average grade received in the junior year of the university.

Sr. Av.—Average grade received in the senior year of the university.

In general, records were literal grades which, for purposes of statistical treatment, were given values as follows: A = 95, B = 85, C = 75, D (failure in high school) = 65, E (failure in university) = 55. These data were evaluated to answer two questions: first, what correlations exist between grades received in different years, and, second, what connection is there between poor scholastic standing and withdrawal from the university.

(1) Of these 100 freshmen, only 23 have as yet finished, or are now

¹The writer is indebted to John V. Barrow and Wm. H. McCrary for much of the statistical work.

finishing, the senior year. On account of this large elimination, the Pearson coefficients of correlation are of very unequal reliability, and the probable errors are accordingly given with each coefficient in the following list:

Correlation between	H. S. E.	and Fr. E.	=.53.	P. E.=.05.
"	"	H. S. M.	and Fr. M. =.57.	P. E.=.05.
"	"	H. S. Av.	and Fr. Av.=.69.	P. E.=.04.
"	"	H. S. Av.	and So. Av.=.74.	P. E.=.04.
"	"	H. S. Av.	and Jr. Av.=.65.	P. E.=.06.
"	"	H. S. Av.	and Sr. Av.=.38.	P. E.=.12.
"	"	Fr. Av.	and So. Av.=.75.	P. E.=.04.
"	"	Fr. Av.	and Jr. Av.=.56.	P. E.=.07.
"	"	Fr. Av.	and Sr. Av.=.28.	P. E.=.13.
"	"	So. Av.	and Jr. Av.=.64.	P. E.=.06.
"	"	So. Av.	and Sr. Av.=.52.	P. E.=.10.
"	"	Jr. Av.	and Sr. Av.=.64.	P. E.=.08.

A comparison of the coefficients brings out the important fact that the correlations between any one year and the succeeding year are very nearly of the same magnitude. There is little to suggest that there is any greater change introduced in passing from the high school to the university than in passing from one year in the university to the next.

Probably high school pupils who later become university seniors form a more homogeneous group than do high school pupils in general, and as homogeneity always tends to lessen correlation, the smallness of the coefficient between these years, .38, is probably partly due to the selective elimination of pupils. This, however, cannot account for very much of the decrease in correlation between last year high school and freshman standing and last year high school and senior standing. Whatever may be the basis upon which credit is given in the last year of the high school, it is of such a nature as to make the standing for this year alone an inaccurate criterion of fitness, as judged by grades received, for advanced university work. This statement is true, whether the varying ability to secure grades in the last year of the high school and the senior year of the university is due to differences of standards upon the part of instructors or to differences in pupils themselves. In either case it is highly desirable that a serious attempt be made to discover early indications of the traits which make for later success in university work. As it now stands, assuming the correlation of .38 to be approximately correct, though its high probable error makes

this assumption somewhat questionable, undoubtedly many students are being eliminated from high school on account of poor work who would have succeeded as university seniors had they continued.

(2) The following measures are available to determine the extent to which elimination is due to failure in university work:

Av. Fr. grade of freshmen who returned for the sophomore year	= 70.7.
(51 in number.)	
Av. Fr. grade of freshmen who did not return for the sophomore year	= 66.3.
(49 in number.)	
Av. So. grade of sophomores who returned for the junior year	= 71.4.
(40 in number.)	
Av. So. grade of sophomores who did not return for the junior year	= 71.8.
(11 in number.)	
Av. Jr. grade of juniors who returned for the senior year	= 75.7.
(23 in number.)	
Av. Jr. grade of juniors who did not return for the senior year	= 70.6.
(17 in number.)	

The difference between the first two averages, 4.4, has a probable error of 1.16, so that the chances are 1 to 190 that the difference is not due to sampling, but due to a real inferiority in average scholastic attainment of the freshmen who left to those who returned for the sophomore year. In the group here studied there was no selective elimination, on the basis of poor standing, at the end of the sophomore year, as the third and fourth averages indicate, and it is found that the elimination drops from 49 per cent. to 22 per cent. At the end of the junior year there is selective elimination, as is indicated by the difference between the fifth and sixth averages, 5.1 (P.E. = 1.98), and the per cent. of elimination, 42, is again large. If we may generalize from this rather scanty data, it may be said that there is about 22 per cent. elimination each year in the University of Texas, due to causes other than failure, and that elimination above this amount is due to difficulty with scholastic work. This statement is meant, of course, as only a very rough approximation—there probably being a systematic error in it, in that all the pupils considered were residents of the university city, and not a random sampling of students in general, but whether this fact increases or decreases the per cent. of elimination due to failure is not apparent.

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University of Texas.

ABSTRACTS AND REVIEWS.

B. R. BUCKINGHAM. *Spelling Ability; Its Measurement and Distribution*. Teachers' College, Columbia University, Contributions to Education, No. 59. 1913. Pp. viii, 116. \$1.25.

The purpose of this research was "to derive a scale for the measurement of spelling ability and to show some of its uses and applications." It endeavors to arrange a series of words on a linear projection in such a way that the words from the lower to the upper end of the measuring scale are located at intervals determined by the difficulty of each word. Such a linear scale would enable us to attain two much desired ends: (1) to measure the spelling ability of any individual, and (2) to determine, in relation to known values, the difficulty of any word in the language.

Tests were made on 8791 children in grades III to VIII, inclusive, and later upon pupils in grade II, of New York City.

As material for the test, 270 words were selected from a list of 5000 words which were found in five of the most popular spelling books in use. All of the 270 words chosen were in the speaking vocabulary of third-grade children, but some of them offered spelling difficulties for eighth-grade children. These 270 words were incorporated in sentences, and the sentences thus formed were dictated to the children. The spelling of each word was scored for each of the different grades, and from the entire number the 100 were selected which showed the most consistent rise in score from grade to grade.

The 100 words thus obtained were again incorporated in sentences, dictated to other children and again scored individually. It was then possible to select from the 100 words two preferred lists of 25 words each.

The purpose of this threefold selection was to secure a list of words ranging in difficulty from easy to hard by definite steps, and of such a nature that the order of difficulty would be practically the same for all the school grades from III to VIII.

That each of the finally-selected 25-word lists approximates this ideal is shown by the high correlation coefficients secured by comparing the grade-to-grade rankings of the words in a single 25-word list. By Spearman's footrule the average intergrade correlation

was .93 for one list and .86 for the other. These results were checked up by Pearson's "product moment" method and by the method of "unlike signs." It is evident, therefore, that the words of the finally-selected lists maintain their relative positions with great constancy in all the schools.

The author next scaled the individual words with respect to difficulty and calculated the amount of weighting necessary for each in order to make the several steps equal. On the basis of this comparison the author was able to arrange three separate lists, as follows: (1) a list of 10 words whose distances were already equal without weighting; (2) two 15-word lists, each list as difficult as the other, and (3) seven groups of 4 words each, made up in such a way that the 4 words of any group were of equal difficulty, but the groups themselves of graded difficulty, on a plan similar to that of the Binet intelligence tests. The last arrangement, the one simulating the Binet scale, is the one which the author considers of greatest value.

The individual pupils were then rated, or 2487 of them, whose papers were sufficiently complete for this purpose. The most striking fact brought out in this section of the study is the astonishing overlapping of the different school grades with respect to the distribution of spelling ability. The surface of frequency showing the distribution of spelling ability for the third grade overlaps the surface of frequency for the eighth grade, while even the median of the fourth grade falls within the surface of frequency for the eighth grade.

In order to test the ability of teachers to judge the difficulty of words, the 50 words whose relative difficulty had been ascertained by refined statistical treatment of the empirical data were alphabetically arranged and submitted to 200 teachers. The teachers were requested to examine the words and rearrange them in order of difficulty. These rankings were then correlated individually and collectively with the correct ranking as previously determined. The result showed the extreme unreliability of the judgment of the individual teachers, whose ranking correlated with the correct ranking by a figure too small to be of any positive value whatever. However, when the rankings of the 200 teachers were pooled, the result showed a correlation of .79 with the correct ranking.

The unreliability of the individual teacher's judgment regarding

the difficulty a given word offers for spelling is shown by the fact that the word which had been proved to be the most difficult of the entire list of 50 words was by one-fourth of the teachers judged the easiest of all. As a result of this fallibility of judgment, spelling books show little agreement in their arrangement of words for use in different school grades, some placing words in the fourth grade lessons which others consider hard enough for the eighth grade, etc.

The author does not claim that his scale for measuring spelling ability is perfect, but he regards it as accurate enough for practical purposes. Stress is laid on the statistical method of deriving the scale and upon its possible value both in rating individuals and in ordering properly the words of a spelling book.

LEWIS M. TERMAN.

Stanford University.

I. E. FINKELSTEIN. *The Marking System in Theory and Practice*. Educational Psychology Monographs, No. 10. Baltimore: Warwick & York, Inc., 1913. Pp. 88. \$1.00.

The subject of marks is often a painful one for both students and teachers. It has been experimentally shown that teachers vary widely in the marks that they give to the same written exercise. It is natural, therefore, that there should be an even wider difference of standard in marking the performance of students for an entire course. This variation in marking works an injustice to those students who are taking courses under instructors who are rigid in their marking scheme, and puts an undesirable premium upon the courses of the easier marker. Many institutions have recognized the unfairness of this inequality of marking standards, and have taken more or less definite steps to remedy the defect. The present monograph gives an outline of the more important of these schemes, and presents a detailed survey of the distribution of marks at Cornell University. An introductory chapter states the problem involved in marking and the significance of marking for the college student. In chapter two the author considers the curve of distribution of college marks and concludes that the normal distribution curve does not represent college ability, but that the curve is skewed to the right. In other words, the largest number of marks of any one type is below rather than at or above the middle mark. The comparison of the percentile system with the two, three, four and five-division systems

leads to the conclusion that the 100 point scale has no psychological justification and is inferior to the five-division system. The study of marks at Cornell includes three sets of data—the marks of 5396 students in 66 courses in the college of arts and sciences during the first term of 1902-03; the marks of 7522 students in the same courses in the following year, and 7430 marks in 31 courses in different colleges of the University. The percentile system is used in Cornell, and the marks range from 35 to 100, with the passing mark at 60. The results of the tabulations are presented in 29 charts, which show graphically the distribution of marks for the institution as a whole, and that for specimen courses chosen for illustrative purposes. In almost all of the courses presented there is a slight but noticeable tendency for the figure to be heavy on the lower end. The author, in conclusion, recommends that every college and high school adopt the five-division system with something like the following distribution: excellent, 3 per cent.; superior, 21 per cent.; medium, 45 per cent.; inferior, 19 per cent.; very poor, 12 per cent. The author further recommends that there be published at least every two years the distribution of the marks actually given, so that everyone may know to what extent he conforms to the principles on which the system is based. The study will serve as a valuable guide to those who are considering the subject of grades, whether in the college or in the high school.

J. C. B.

O. DECROLY. *Epreuve nouvelle pour l'examen mental et son application aux enfants anormaux*. Extrait du Bull. de la Soc. d'Anthropologie de Bruxelles. Vol. 32, Dec., 1913. Pp. 25.

Those who have followed the critique of the Binet-Simon tests will remember that Decroly was one of the first to object to the undue stress laid in that series of tests upon ability to understand and use language. He has now proffered a test of "practical logic" which can be carried out with little or no use of language. The plan of this test is to set before the child a series of four to eight pictures which represent the development of a scene or action. The several component pictures are given in a predetermined, but illogical order, and the task is to arrange them in such an order as to "make sense." The experimenter records the result and the time taken, and if the child's arrangement be a wrong one, asks him to tell the story as he understands it.

Eleven sets of pictures of this sort were given to over 300 children of both sexes, some normal, some defective, some of higher social classes.

The results show a good correspondence with age, both with respect to quality and quantity of work. Decroly concludes that (1) it would be possible to devise a set of these tests which would afford a reliable method of determining mental age, (2) for a given set of pictures, speed of solution furnishes a satisfactory index of performance, (3) there appears a dependence upon social status which coincides, after all, with the dependence revealed by the Binet tests that involve language, (4) defective children are sorted out by the test in such a way that those with truly intellectual deficiencies prove decidedly inferior, whereas those with merely special mental defects (sensory, motor, etc.) are but slightly, if at all, inferior to normal children; (5) pedagogically backward children rank about two years below normal children, (6) the test brings out special mental types, *e. g.*, the incoherent, the illogical, the logical, the imaginative, etc.

More detailed results may be expected soon in *Revue belge de pedotechnie*.

The reviewer is impressed with the possibilities latent in this new test, and would commend it to the attention of American investigators who are anxious to establish improved diagnostic instruments to replace or supplement those already provided in the Binet-Simon scale.

G. M. W.

W. H. WINCH. *Inductive versus Deductive Methods of Teaching: An Experimental Research*. Educational Psychology Monographs, No. 11. Baltimore: Warwick & York, Inc., 1913. Pp. 146. \$1.25.

The author states that this is the first attempt to decide between the conflicting aims of inductive and deductive methods by experimental procedure. The general plan of the experiment was as follows: A class was divided into two equal groups on the basis of their definition of certain geometrical shapes. Both sections had the same teacher and the same syllabus of instruction. One of the groups was taught geometrical definitions inductively; the other learned the definitions as they were stated, but were given to understand that the exact words were not important so long as the meaning was re-

produced. The two groups were tested immediately on learning, and after shorter and longer intervals had elapsed. The preliminary test consisted in the presentation of squares, triangles, oblongs, and diameters of circles, while upon the blackboard the questions were written: What is a square? What is a triangle? What is an oblong? What is the diameter of a circle? One mark was given for each common attribute correctly mentioned. The class was then divided and one of the groups was drilled on the wording of the definitions for the four kinds of figures, while the other group was taught inductively by questioning the pupil until he brought out the essential characteristics of the figure. Immediate tests showed no difference between the ablest children of the two sections, but in the weaker sections the deductive method attains superior results. In delayed reproduction the advantage of the deductive method was even more marked. As judged by ability to grasp new material, however, the inductive group made the better showing. Similar results were obtained in all five of the schools tested. The author's general conclusion, therefore, is that where exact reproduction is required, either at once or after a lapse of time, the deductive method of procedure is the best; but if it is a part of the aim in teaching to train the pupil to apply himself readily to new material, the inductive method is superior.

J. C. B.

SIGMUND FREUD. *Psychopathology of Everyday Life*. Edited, etc., by A. A. Brill. New York: The Macmillan Company, 1914. Pp. vii, 342. \$3.50.

Educational psychology most certainly has yet many things worth while to learn in regions in which Freud was pioneer, and this volume reports for the English reader one of these new districts, although it offers no maps, so to say, for the aid of followers. In other terms, it is high time that education began effectively to make use of the far-reaching facilities afforded it by the subconscious. Hidden motives to behavior chiefly determine the course of our lives. How much longer can educators ignore the fact or fail to apply it? Most of the academic psychologists have already been converted to the dim glimmers of the subconscious light. Need the pedagogues be so far behind?

The chapter headings of this volume reveal its drift: "Forgetting of proper names; forgetting of foreign words; forgetting of names

and order of words; childhood and concealing memories; mistakes in speech; mistakes in reading and writing; forgetting of impressions and resolutions; erroneously carried out actions; symptomatic and chance actions; errors; combined faulty acts, and determinism, chance and superstitious beliefs."

Imagine as an abstract proposition a world-system of education which still quite ignores the true causes of many of the errors of children and of adults as though these causes had no scientific standing whatever! As Freud says: "One may possibly be disinclined to consider the class of errors which I have explained as very numerous or particularly significant. But I leave it to your consideration whether there is no ground for extending the same points of view also to the more important errors of judgment as evinced by people in life and science. Only for the most select and most balanced minds does it seem possible to guard the perceived picture of external reality against the distortion to which it is otherwise subjected in its transit through the psychic individuality of the one perceiving it." We may truly add, I think, "and then not much."

Educators must certainly begin to apply the products of modern research into the mind's deeps. Freud, better than another, will help them to inform themselves.

The book is cheaply bound, and it is worth noting that in these days of the high cost of bare living, \$3.50 is too much for the publishers to charge for a volume of about 85,000 words, with only one, and that an inexpensive, illustration. It is not usual to price a book according to its educational value.

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EDITORIAL.

Why should not institutions of learning advertise for men to fill positions in their faculties, just as any well-conducted business advertises for trained salesmen, managers, accountants and other employes? We have been asked this question several times by laymen, and we have been obliged to answer: "Because it isn't customary!" Then we are reminded that it is customary in England and perhaps elsewhere. But here in America it appears not to be 'good form,' for university men at least, to indicate in any public manner a desire to change their positions, nor for institutions to indicate publicly what positions are to be filled.

The results of this policy are sometimes amusing, as when one contemplates the amount of time and energy wasted in correspondence and interviews in the effort to 'get a line' on men that might be available without letting it be known too generally that such-and-such a place is open, that so-and-so is going to resign and that X is being considered by Y for a place at Q.

At other times the results are more pathetic, as when one contemplates the scores of wrong men in wrong positions, all for the lack of a bit of knowledge that might have come from reasonable publicity.

Take the case recently brought to our attention in which the position called for a special combination of training and of personal traits. Those who were anxious to fill the position knew of three men who embodied this combination, but no attempt was made to secure their services because it was supposed that one of these men was already receiving a higher salary than was to be offered and that the other two would not accept a call to the particular institution in question. A fourth-choice man was secured, and it was accidentally discovered a week later that any one of the three qualified men would have accepted the call. Two of them had not heard of the opening; the third knew of it, but refused to make any effort to secure it, because he cherished the notion that "the position should seek the man, not the man the position."

Another outcome of our present system, or present lack of system, is the development of an undesirable amount of 'inbreeding.' The catholicity of learning is an ideal that often takes second place to institutional loyalty. Heads of departments resort to their own *Alma Mater* for their recruits, while those who are training teachers and instructors are too often blind to the merits, or even to the existence, of men of promise in other institutions. The spectacle of a department in a certain university in which instruction is given by eleven men, every one of whom is a graduate of the same institutions as the departmental head, offers a melancholy example of this inbreeding.

In another instance that has come to the writer's attention a list of men that might be considered in filling a certain position had been secured by an extensive and properly 'secret' correspondence. The official who held the appointive power then carried this list to a friend in another institution who was supposed to be an 'expert' in the field in question. This expert pronounced two of the list to be 'wonders' and 'coming men,' and condemned the remaining ten outright. The circumstance that these two men were graduates from the expert's classes and the others not did not deter the official from making an immediate appointment without inspecting the qualifications of the others.

There are doubtless some advantages in our present practise and possibly some disadvantages in the plan of advertising. We should be glad to print expressions of opinion from our readers.

G. M. W.

NOTES AND NEWS.

A strenuous effort is being made by the people of Alabama to reduce illiteracy in that state. An Illiteracy Commission has been appointed to organize the work, and the governor of the state designated June 7 as "Illiteracy Day," on which "the people shall meet, confer and organize clubs for the banishment of illiteracy in the several communities." Such a popular, state-wide movement is indicative of the new spirit in the South, and by focusing attention upon the importance of education in the life of the community will give a stimulus to educational investigations of all sorts.

At the joint summer meeting of the American Psychological Association and Section H of the American Association for the Advancement of Science, to be held at the University of California and at Stanford University, August 3-5, sessions will be devoted to mental tests and their pedagogical significance, reports of experimental investigations in general psychology, psychical research, and psychology in relation to medicine and animal psychology. Most of the sessions will be held at the University of California, but Wednesday, August 4, will be spent at Stanford.

Dr. Frank W. Ballou, director of the department of educational research and measurement, Boston Public Schools, has recently published a series of forms to be used in indicating the efficiency of teachers. The series consists of three blanks, one to be filled out by the teacher himself, dealing with academic and professional preparation; one by the principal, dealing with executive ability and discipline, and one by the inspector of teaching, dealing with the conduct of the recitation.

Dr. Fred J. Kelly of the bureau of educational measurements and standards, State Normal School, Emporia, Kan., has devised a silent reading test for grades V, VI, VII and VIII. The test consists of 16 exercises, carefully graded in value from 1 to 10, each presenting a problem whose solution depends on understanding the conditions, and whose answer can be indicated in a word. Five minutes are allowed for the test.

The Vocation Bureau of Boston, under the direction of Meyer Bloomfield, has issued an interesting pamphlet on "Vocational Guidance," setting forth the needs for guidance both in school and out, the work of the Vocation Bureau and its co-operation with the Boston public schools. The pamphlet contains a list of publications and indicates several projected studies.

The summer school course for teachers of defectives, established last year under the directorship of Dr. Charles Scott Berry of the University of Michigan at the Training School for Feeble-Minded, Lapeer, Mich., has been made a part of the summer school work of the Michigan State Normal College at Ypsilanti, Mich. Dr. Berry continues as director, and the course has been broadened to meet the needs of public school teachers in their dealings with pupils who are in some way exceptional. The transfer increases the facilities for observing both normal and abnormal children, gives an opportunity of taking related courses in the Michigan State Normal College and enables teachers to receive full credit toward a degree for the work done in the training course.

At the summer school of Harris Teachers' College, St. Louis, Dr. Withers will give courses in educational psychology, Professor Kilpatrick of Columbia University in principles of early education, Dr. Payne in social psychology and child study, and Dr. Wallin in the clinical study of exceptional children.

A new periodical has been established in New York City, called *Ungraded*, and published in the interests of the retarded child. It is the hope of the publishers to co-ordinate the sporadic activities which are now carried on all over the country in the effort to take better account of peculiar and exceptional children, to increase the efficiency of teachers of ungraded classes and to keep all teachers informed of the developments in this field. The journal is published by The Ungraded Press, 1701 Fulton avenue, New York.

Prof. Ernst Meumann, founder and editor of the *Archiv fuer die gesammte Psychologie* and of the *Zeitschrift fuer Experimentelle Paedagogik*, author of *Vorlesungen zur Einfuehrung in die Experimentelle Paedagogik*, *Ueber Oekonomie und Technik des Lernens*

and other important works on psychology and education, died at Hamburg, Germany, April 27, 1915, at the age of 53 years. Professor Meumann was a pioneer in the application of experimental methods of investigation to educational problems, and has been one of the most prominent workers in the development of the new science of experimental pedagogy.

Sir Thomas Smith Clouston, well known for his contributions to abnormal psychology and psychiatry, died at Edinburgh, April 19, at 75 years of age.

According to the daily press, Dr. Henry Suzzallo, professor of the philosophy of education (educational sociology), Teachers' College, Columbia University, editor of the *Riverside Educational Monographs*, has been elected president of the University of Washington, Seattle, Wash.

Dr. Lotus D. Coffman, professor of education at the University of Illinois, has been elected dean of the College of Education at the University of Minnesota. Dr. Coffman will enter upon the duties of his new position in September.

The Butler gold medal to be awarded every fifth year by Columbia University for the most distinguished contribution made during the preceding five-year period to philosophy or to educational theory, practice or administration will be given to the Hon. Bertrand Russell, F.R.S., lecturer and fellow of Trinity College, Cambridge, for his contribution to logical theory. The Butler silver medal is to be awarded to Prof. Ellwood Patterson Cubberley of Leland Stanford, Jr., University for his contributions to educational administration.

Mr. Harold O. Rugg, who finishes his graduate work at the University of Illinois in June, has been appointed instructor in education at the University of Chicago.

Prof. Daniel Starch of the University of Wisconsin will give courses in educational measurements at the University of Washington, Seattle, during the coming summer session.

PUBLICATIONS RECEIVED.

(Notice in this section does not preclude a more extended review.)

BENJAMIN R. ANDREWS. *Education for the Home. Part II.* Bulletin No. 611. Pp. 207. *Part III—College and Universities.* Bulletin No. 612. Pp. 109. *Part IV—List of References on Education for the Home.* Bulletin No. 613. Washington: Bureau of Education, 1915.

Part II of this series of bulletins deals with the organization of home education in rural schools, elementary and high schools, grammar schools, and technical institutes. The plan of the series is to describe fully the work done in typical institutions, and on the basis of this account discuss the general aspects of home education in connection with the different grades of school.

CAROLYN SHERWIN BAILEY. *Montessori Children.* New York: Henry Holt & Co., 1915. Pp. vii, 188. \$1.25.

An account of a visit to Rome and a first-hand study of the conditions observed there. There is an introductory chapter on the personality of Montessori, which is followed by a portrayal of individual children in their experiences with the Montessori apparatus and method. This description of scenes from the conduct of actual children makes the book very vivid and entertaining. As might be expected, the tone of the book is highly laudatory of the Montessori procedure.

BIRD T. BALDWIN. *Present Status of the Honor System in Colleges and Universities.* Bulletin No. 632. Washington: Bureau of Education, 1915. Pp. 31.

The author briefly traces the history of the honor system, presents a list of questions sent to presidents of colleges and universities seeking information about its workings, indicates the aim and purposes of the honor system, its use in different departments, the institutions planning to adopt the system, and those in which there is no prospect of its adoption and where the authorities frankly oppose it.

ROBERT H. BRADBURY. *An Inductive Chemistry.* New York: D. Appleton & Co., 1912. Pp. x, 415.

The author has attacked the problems of chemistry from the standpoint of the knowledge that may be assumed in high-school pupils. Throughout the book there is emphasis upon the practical

and the familiar, but the discussion of these leads into the heart of chemical phenomena. The topics are well articulated and interestingly developed. A feature of the book is the large number of pictures of eminent chemists, with brief explanation of their contributions to the advancement of the science.

ROBERT H. BRADBURY. *Laboratory Studies in Chemistry*. New York: D. Appleton & Co., 1912. Pp. ix, 129.

A laboratory manual for use with the author's text on "Inductive Chemistry."

H. ADDINGTON BRUCE. *Psychology and Parenthood*. New York: Dodd, Mead & Co., 1915. Pp. xi, 293. \$1.25.

A popular presentation of those aspects of social and medical psychology which the author believes are important for parents. Throughout the book great emphasis is laid upon the subconscious, whether in the discussion of the importance of the environment in establishing the fundamental factors of the subconscious, in the effect of the subconscious on education, in the examination of the nature of genius, or in the intensive cultivation of the child's capacities in his earlier years. There is a chapter on laughter, another on hysteria in childhood, and another on the menace of fear. The book shows the results of wide reading and the style is entertaining, but the psychology is of a decidedly superficial type.

OTHO G. CARTWRIGHT. *The Middle West Side—A Historical Sketch*.

KATHARINE ANTHONY. *Mothers Who Must Earn*. New York: Survey Associates, Inc., 1914. xiii, 67. viii, 223. \$2.00.

This volume of "West Side Studies" introduces the reader to the geographical and historical conditions of the district surveyed, shows the effect of increasing industrial activities and analyzes the character of the population.

The second monograph portrays the home life of the district, describes the outlook of the mother, depicts her conjugal status, discusses the occupations available for her, her hours of work, her wages and income, and the drain upon her physical constitution.

W. W. CHARTERS AND EDITH MILLER. *A Course of Study in Grammar Based Upon the Grammatical Errors of School Children of Kansas City, Mo.* The University of Missouri Bulletin, Vol. 16, No. 2, January, 1915. Pp. 45.

Material was collected which affords definite and fairly accurate evidence of the mistakes of pupils in written and oral language. These errors were carefully tabulated and analyzed, and on the basis

of this analysis 27 rules were formulated which cover all of the errors found. There is a comparison of the resulting course of study in grammar with the present elementary course, indicating the omissions and additions which should be made. It is significant that the omissions include twenty topics and the additions only two.

EDWIN G. CONKLIN. *Heredity and Environment in the Development of Men*. Princeton University Press, 1915. Pp. xvi, 533. \$2.00.

The Norman W. Harris Lectures for 1914 at Northwestern University. "In attempting to present to a general audience the results of recent studies on heredity, with special reference to their application to man, the author has had to choose between simplicity and sufficiency of statement; between apparent dogmatism and scientific caution; between a popular and a scientific presentation. These are hard alternatives, but the first duty of a lecturer is to address his audience and to make his subject plain and interesting if he can, rather than to talk to the scientific gallery over the heads of the audience." The author has succeeded admirably in his task of presenting in simple form the results of recent scientific studies in heredity, and has produced a book of distinct significance for the foundations of education. Among the topics discussed are the phenomena and the factors of development, both physical and mental; the cellular basis of heredity, a survey of the phenomena of inheritance, the influence of the environment, the control of heredity or the science of eugenics, and a final chapter on eugenics and ethics. The book makes a valuable contribution to the popularization of the biological point of view, which is so much to be desired.

C. WARD CRAMPTON. *Physical Training and Hygiene*. An Extract from the Sixteenth Annual Report of the New York City Superintendent of Schools, 1913-14. Pp. 37.

In the section on hygiene there is an interesting discussion of an experiment in the care of children's teeth in a Brooklyn district. Three hundred and twenty-seven children were selected, and from these 164 were assigned to various dentists who volunteered to treat the children without cost. Many children failed to keep up the treatment, but 82 were finally discharged in good condition. There is a tabulated statement of the care given to the teeth, and of the reports of school principals upon the school records of these children with respect to their general average in studies, their deportment, and their attendance. Dental treatment seems to be accompanied by a considerable improvement in each of these fields. There are interesting recommendations on the hygiene of the eye, on the maintenance of swimming-pools in every public school, and on medical inspection.

PHILIP DAVIS, Editor. *The Field of Social Service*. Boston: Small, Maynard & Co., 1915. Pp. 436. \$1.50.

A collection of essays by various writers on numerous aspects of social work. There are chapters by Robert A. Woods, Jeffry R. Brackett, Richard C. Cabot, Joseph Lee, Meyer Bloomfield and other well-known leaders in the work of social amelioration. Part I discusses the background in social work; Part II, community problems, such as housing, fire prevention, health, playgrounds, recreation and immigration; Part III, the community and the child, with especial reference to fitting the child for a useful part in the community, and Part IV discusses the social agencies which are most active in social betterment.

GEORGE V. N. DEARBORN. *Some of the Sanctions of Sex*. Reprinted from the American Physical Education Review, January, 1915. Pp. 7.

A plea for greater enlightenment of the young in the facts of sex. An address before a popular audience emphasizing the importance of training in sex matters as a regular part of education.

L. DONCASTER. *The Determination of Sex*. New York: G. P. Putnam's Sons, 1914. Pp. xii, 172.

The present volume by the author of "Heredity in the Light of Recent Research" presents in detail in as simple a form as possible the results of recent biological research on the subject of sex determination, sex limited inheritance, the physical basis of sex, sex ratio, secondary sexual characters, and general conclusions as to the factors that determine sex. The book contains a large number of excellent illustrations, and six pages of selected bibliography.

LIDA B. EARHART. *Types of Teaching*. Boston: Houghton-Mifflin Company, 1915. Pp. xvi, 277.

The chief weakness of teachers is lack of clear and definite aims as to what they are to accomplish in each lesson, and the present book is designed primarily to help young teachers in attaining a clear consciousness of their aims in teaching. The book cannot be said to add anything very striking or original to the present treatises on teaching, but presents a discussion in simple and vigorous style of the usual topics that are urged upon the consideration of teachers. Throughout the book emphasis is laid upon the social relationships involved in school activities. Perhaps the most valuable chapters are those on the assignment of lessons, on the recitation, and on training pupils to study.

CHARLES HERBERT ELLIOTT. *Variation in Achievements of Pupils.* Columbia University Contributions to Education, No. 72. New York: Teachers' College, Columbia University, 1915. Pp. 114. \$1.25.

The subtitle of this monograph is "A Study of the Achievements of Pupils in the Fifth and Seventh Grades and in Classes of Different Sizes," and in determining these achievements the author makes use of tests in spelling, in penmanship (using the Thorndike Scale), in English composition, in range of vocabulary, and in arithmetic, employing No. 7 of the Courtis Tests in Arithmetic, Series A. The tests in English composition were scored by the Hillegas Scale. Standards are set up for fifth and seventh grade pupils in each of these subjects, and the amount of individual variation indicated. On the basis of the results, the author pleads for smaller classes and greater individualization of the work of teaching.

THOMAS FLETCHER. *The High School Program of Studies.* Bulletin University of Texas, 1915, No. 2. Pp. 84.

The author discusses the function of the high school, the teaching force, and the dangers of over-expansion of the program in over-taxing both teachers and pupils. There is a large amount of interesting data on programs of Texas high schools.

HAROLD W. FOGHT. *Efficiency and Preparation of Rural School Teachers.* Bulletin No. 623. Washington: Bureau of Education, 1915. Pp. 54.

The author presents statistical data showing the low grade of preparation for elementary school teachers, and points out many things which he deems essential in setting a higher standard. There is an interesting account of the effect of consolidation in rural districts upon the improvement of the character of the instruction.

PHILIP W. HARRY. *French Anecdotes.* Cincinnati: American Book Co., 1915. Pp. 165.

One hundred simple stories and fables for the beginner in French. These are supplemented by a series of questions on each anecdote, an extensive list of familiar phrases and idioms, and a vocabulary.

WALTER L. HERVEY AND MELVIN HIX. *The Horace Mann Readers. Primer and Books One to Five. Daily Lesson Plans, and Teachers' Manual.* New York: Longmann, Green & Co., 1915.

This series of readers contains carefully graded selections from the best literature, presented in attractive material dress. The illustra-

tions are excellent and the methods of developing the material accord with approved psychological principles.

JOHN C. HESSLER. *The First Year of Science*. Chicago: Benj. H. Sanborn & Co., 1914. Pp. xiv, 484.

This is a typical expression of the present-day attempt to reorganize science teaching in the high schools, and especially to provide a first year of "general science," so called. In its 484 pages it "covers" the following topics: matter and measurement, force and energy, air and fire, heat, water, elements and compounds, carbon and its compounds, magnets and electricity, light and sound, simple machines, acids, alkalis and cleaning, water, heat, air and light in the house; the weather, rocks and soils, plants, animals, the human body and its food, circulation and respiration, the nerves and sense organs, sanitation. A reaction against the abstractness of the high school science courses has been due for a long time. Here we have a return with a vengeance to the older type of science teaching. Steele is "out-Steeled"—"thirteen weeks" in physics or chemistry or physiology gives place to thirteen days or less. The book is well written and well illustrated. The virtues or weaknesses of the movement which it represents only the future can reveal.

E. LAZAR UND W. PETERS. *Rechenbegabung und Rechendefekte bei abnormen Kindern*. Fortschritte der Psychologie. Vol. 3, No. 3, February, 1915. Pp. 167-184.

A careful study of two abnormal cases, one showing marked ability and the other as marked defect in arithmetical computation. Arithmetical ability as determined by tests was compared with status of the children as indicated by the Binet Tests, memory experiments, completion tests, abstraction tests, and a cancellation test.

ARTHUR W. LEONARD AND CLAUDE M. FUESS. *A High School Spelling Book*. Cincinnati: American Book Co., 1915. Pp. 103.

There are one hundred and fourteen lists of words often misspelled, and brief lists of difficult words in each of the more important high-school subjects.

WILLIAM A. MCKEEVER. *Outlines of Child Study*. New York: The Macmillan Company, 1915. xiv, 181. \$1.00.

Part I presents a brief and quite inadequate account of child study organization, and Part II offers 112 child study programs designed for parent and teacher associations, mothers' clubs, and kindred organizations. The book may be of some practical service, but has nothing whatever to offer to specialists.

FRANK A. MANNY. *City Training Schools for Teachers*. Bulletin No. 621. Washington: Bureau of Education, 1915. Pp. 165.

An interesting presentation of the efforts of larger cities in the United States to afford professional training for elementary school teachers. The author indicates the function, and traces the development of the city training school, gives entrance requirements and courses of study, and describes the relations of graduates to the city school system. There is a good working bibliography, and a detailed account of the organization of the Boston Normal School.

A. C. MONAHAN. *Organization of State Departments of Education*. Bulletin No. 629. Washington: Bureau of Education, 1915. Pp. 46.

A valuable statistical compilation of the organization of state supervision of education in the United States.

J. HOWARD MOORE. *The Law of Biogenesis*. Chicago: Charles H. Kerr & Co., 1914. Pp. 123.

The material presented in these pages was collected for a course of lectures to high school pupils, and the author's aim is to sketch a simple outline picture of the more important evidence for the doctrine that the development of each individual living creature retraces the history of the race. Part one deals with the evidences of physical development, part two with those of mental development. The book can be read with pleasure even by high school freshmen, and will stir within them a desire to know more about the phenomena of life.

GARRY C. MYERS. *A Comparative Study of Recognition and Recall*. Reprinted from the *Psychological Review*, Vol. 21, No. 6, November, 1914. Pp. 442-456.

Recognition efficiency is about two and a half times that of recall. There is a surprisingly low correlation between the two.

GARRY C. MYERS. *Affective Factors in Recall*. *The Journal of Philosophy, Psychology and Scientific Methods*, Vol. 12, No. 4, February 18, 1915. Pp. 85-92.

From experiments on children in three schools the author concludes that "one tends to recall the thing best liked more readily than that least liked."

IRIS PROUTY O'LEARY. *Cooking in the Vocational School as Training for Homemaking*. Bulletin No. 625. Washington: Bureau of Education, 1915. Pp. 36.

"It is the purpose of this bulletin to discuss the conditions which underlie the necessity for instruction in cooking, to define the aim of such instruction, and to offer suggestions that may be of service toward the final solution of the problem." An interesting feature of the report is the advocacy of part-time classes for housekeepers.

W. PETERS. *Zur Entwicklung der Farbenwahrnehmung nach Versuchen an abnormen Kindern*. Fortschritte der Psychologie, Vol. 3, No. 3, February 27, 1915. Pp. 150-166.

Children that have no names for colors do not make any mistakes in differentiating between the primary and secondary colors. They do confuse these, however, if one intentionally gives a secondary color the name of the primary color lying near it. Children who name the secondary colors correctly do not make this mistake, and those who made it at first do not make it after they have been taught the names of the secondary colors.

ANNA M. PETERSEN AND E. A. DOLL. *Sensory Discrimination in Normal and Feeble-Minded Children*. Reprinted from the Training School Bulletin, November and December, 1914. Pp. 18.

An experimental study of the discrimination of lifted weights in relation to mental age. The authors conclude that this is a function of intellectual rather than sensory capacity. The discrimination of defectives is slightly below that of normals of the same mental age.

The Public Schools and Women in Office Service. Studies in Economic Relations of Women. Vol. 8. Boston: Women's Educational and Industrial Union, 1915, xv, 187. 80 cents.

There is a survey of commercial occupations and the function of the schools in relation to them, a study of the problems of the public school with respect to vocational guidance in commercial lines, an analysis of the character of office service, a discussion of wages, and a description of home life and responsibilities of pupils in five different schools. In conclusion, part time schooling for office service is urged and more time is demanded for training in work that is required in office service.

CARL G. RATHMANN. *The Educational Museum of the St. Louis Public Schools*. Bulletin No. 622. Washington: Bureau of Education, 1915. Pp. 55.

The verbal description of the resources of the museum is amplified by a large number of illustrations.

WOODBIDGE RILEY. *American Thought from Puritanism to Pragmatism*. New York: Henry Holt & Co., 1915. Pp. viii, 373.

A delightfully entertaining and informing account of the chief American contributions to philosophical thought. Of particular interest are the chapters on transcendentalism, evolutionism, modern idealism, and pragmatism. The book is a valuable contribution to the history of philosophy.

ERNEST W. ROBINSON. *Annual Report of the School Committee—Webster, Mass., February 1, 1915*. Pp. 62.

The report contains an age and group distribution table and statistics of attendance, school property, sickness, etc.

F. ROEMER. *Assoziationsversuche an geistig zurückgebliebenen Kindern*. Fortschritte der Psychologie, Vol. 3, No. 2, December, 1914. Pp. 43-101.

A comparison of abnormal with normal children in a free association test. The associations of abnormal children differ considerably from those of normal children, particularly in the use of adverbs and pronouns. They have fewer preferred associations than normal children, and these are frequently of different type. The correlation between age and the number of preferred associations is higher in normal than abnormal children.

L. W. SACKETT. *The Sequence of Topics in Beginners Psychology*. Reprinted from the Psychological Bulletin, Vol. 12, No. 3, March, 1915. Pp. 89-99.

An analysis of the order of presentation of topics in twelve of the most popular texts in psychology for beginners, and a tabulation of the results of a questionnaire on this topic. The study shows a remarkable lack of agreement in the different authors as to the order in which topics should be taken up and the connection of topics with each other.

HANNAH KENT SCHOFF. *The Wayward Child*. Childhood and Youth Series. Indianapolis: The Bobbs-Merrill Company, 1915. Pp. 274. \$1.00.

This book is the outgrowth of the author's personal study of a large number of children arrested for crime and put on probation. The author gives an analysis of the principal crimes that fill the prisons; shows how boys become criminals through the influences of the home, of the factory, of the schools, and of the state; discusses the place and work of the juvenile court and probation officers, and points out the most effective means for dealing with the restless

adolescent who is apt to come into conflict with the law. Such books as this reveal the human side of the delinquent and make it more possible to afford him real help.

KATHARINE E. SLOAN. *The New Sloan Readers—Primary*. New York: The Macmillan Company, 1915. Pp. 128. 30 cents.

The aim of this series of readers is to give the child in the most direct way and in the shortest time the independent power to read. Words are first treated as wholes, but this word method is supplemented by phonetics to develop the power of mastering new words. The text is richly illustrated in colors, and will prove very attractive to children, although the arrangement of material violates important principles in the eye-movements of reading.

A Study of the Colleges and High Schools in the North-Central Association. Bulletin No. 630. Washington: Bureau of Education, 1915. Pp. 130.

Each institution of the association is examined with reference to the number of the faculty, the number of faculty members who have the Ph.D. degree, the number of matriculated students, degrees granted in courses, elementary course of instruction actually given, advanced courses, professional courses, expenditures for salaries, hours of class instruction, and material equipment. There are numerous diagrams and tables indicating the exact status of the schools in question.

RUTH S. TRUE. *Boyhood and Lawlessness. The Neglected Girl*. New York: Survey Associates, Inc., 1914. Pp. xix, 215. iii, 143. \$2.00.

These two monographs, bound in one volume, constitute an instalment of the "West Side Studies," carried on under the direction of Pauline Goldmark for the Russell Sage Foundation. The first study—*Boyhood and Lawlessness*—is one of the most careful and detailed surveys of juvenile delinquency in an urban community that has been produced, and shows how necessary is a careful and thorough study of general social phenomena to an understanding of the conditions that make for crime. The chief object of the monographs is accurate description, and it was not found possible to suggest adequate remedies for the conditions presented. There is a general account of the quarter and its inhabitants, a study of boys' games and recreations, the organization and activities of the boy gangs, home conditions, the boys' relations with law, and with the court, and the final chapter directs attention to the crux of the problem, which is

found in the demoralizing social influence with which the children are surrounded.

The second monograph, by Miss True, gives an equally vivid, if depressing, picture of the lives of girls in this region. Painful as such accounts are, they are necessary, if we are to grapple with the social problem of the life of children in such congested districts.

NELLIE E. TURNER. *Teaching to Read*. Cincinnati: American Book Co., 1915. Pp. viii, 520.

This is a novel treatise on the theory of reading. It consists of a brief statement of the fundamental principles discussed in each chapter, followed by carefully chosen illustrations of the points the author has attempted to establish. The book is designed especially for teachers of the higher elementary grades and offers abundant material for practice.

FLORENCE GUERTIN TUTTLE. *The Awakening of Woman. Suggestions from the Psychic Study of Feminism*. New York: The Abington Press, 1915. Pp. 164. \$1.00.

The author thinks that the woman question has been misunderstood, and devotes the first chapter to clearing up and putting in the proper light the question of woman's place in the solution of social problems. There follows a discussion of woman and genius, and the reasons why it is desirable for women to be mentally creative. Under the social awakening, the author points to the reorganization of our concepts of value in woman's work, and the significance of motherhood in limiting the activities of women. Further chapters discuss the relation of woman to eugenics and of spiritual selection in marriage. Genuine productive efficient service should be the slogan of every intelligent woman.

J. HAROLD WILLIAMS. *A Study of One Hundred and Fifty Delinquent Boys*. Research Laboratory of the Buckel Foundation, Bulletin No. 1. Stanford University, California, February, 1915. Pp. 15.

A study of the pupils in the Whittier State School, Whittier, Cal., with reference to their mental abilities. The boys ranged from 10½ to 21 years of age, with 16½ as the median. They were examined by the use of the Stanford Revision of the Binet-Simon Measuring Scale of Intelligence. As a result of the examination, 28 per cent. were pronounced definitely feeble-minded, 25 per cent. were borderline cases, 22 per cent. dull normals, and the remaining 25 per cent. normal or above.

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MEASUREMENT OF THE DRAWING ABILITY OF TWO THOUSAND ONE HUNDRED AND SEVENTY-SEVEN CHILDREN IN INDIANA CITY SCHOOL SYS- TEMS BY A SUPPLEMENTED THORNDIKE SCALE

H. G. CHILDS

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During the winter of 1914, the writer, in coöperation with his class in School Administration, decided to use in a limited way the newly constructed Thorndike Scale to measure achievement in drawing for the purpose:

1. Of determining growth in ability from grade to grade.
2. Of determining standards or norms of ability for each grade.
3. Of determining limitations of the scale in actual use.
4. Of determining what administrative problems would be brought to light which might be desirable for supervising authorities to know.

METHOD OF DERIVING THE SUPPLEMENTED SCALE

A preliminary consideration of the scale and its application to a limited number of drawings convinced us that for our purposes it would be desirable to supplement the scale so that there might be a greater degree of uniformity in the composition represented by the different units of the scale. As several units

on the Thorndike Scale and many of the supplementary drawings represented snow scenes with action, it occurred to us to construct a scale every unit of which should represent a snow scene with human figures in action, placing houses, landscapes, etc., as accessory features.

For the purpose of supplementing the scale, drawings were chosen from the Thorndike supplementary sheet, numbered from one hundred one to one hundred seventeen, eleven of which represent snow scenes with human figures in action.

Seventeen judges were secured, consisting of teachers, graduate students, and seniors in Indiana University, to rank these supplementary drawings.

Tables I and II show the results of the comparisons.

TABLE I.
Rank Assigned Each Sample.

Judge.....	1	2	3	4	5	6	7	8	9	10	11
A.....	116	106	107	110	111	108	104	103	101	105	102
B.....	116	106	107	110	111	108	104	101	103	105	102
C.....	110	116	107	106	111	108	101	103	104	105	102
D.....	110	107	116	106	108	111	104	101	103	105	102
E.....	116	107	106	110	111	108	105	101	103	104	102
F.....	116	107	110	106	111	108	104	103	101	105	102
G.....	116	107	110	106	111	108	104	103	101	105	102
H.....	116	110	107	106	111	108	104	103	102	105	101
I.....	116	106	107	110	111	108	104	103	101	105	102
J.....	116	110	107	106	111	108	104	101	103	105	102
K.....	110	107	116	108	111	106	104	103	101	105	102
L.....	116	107	110	108	111	106	104	105	103	101	102
M.....	110	111	116	106	107	108	104	103	101	105	102
N.....	116	107	110	111	108	106	105	103	101	104	102
O.....	116	107	110	106	111	108	104	101	103	105	102
P.....	110	106	116	107	108	111	104	101	105	103	102
Q.....	116	107	106	110	111	108	104	101	103	105	102

1, 2, 3, etc.—11 represent the relative values from the poorest to the best.

From a comparison of the rankings of Table I, the percentage relationships expressed in Table II were derived.

TABLE II.

88%	of the judges rated	107	as better than	116
71%	" " " "	106	" " "	107
76%	" " " "	111	" " "	106
76%	" " " "	108	" " "	111
100%	" " " "	104	" " "	108
82%	" " " "	101	" " "	104
82%	" " " "	105	" " "	101
94%	" " " "	102	" " "	105

Samples 110 and 103 were omitted because they were given almost equal value with 107 and 101 respectively.

Considering the difference detected between two samples by seventy-five per cent. of the judges as unity, the samples in Table II have the following relative values:

TABLE III.

Sample 107	is	1.7	units	better	than	sample 116
" 106	"	.8	"	"	"	107
" 111	"	1.0	"	"	"	106
" 108	"	1.0	"	"	"	111
" 104	"	3.5	"	"	"	108
" 101	"	1.4	"	"	"	104
" 105	"	1.4	"	"	"	101
" 102	"	2.3	"	"	"	105

Having secured this table of relative values for the supplementary samples used, the next step in perfecting the supplemented Thorndike Scale was to fix, by comparison, the value of one, or better yet, of several of these samples on the Thorndike Scale. For this purpose ten of the seventeen judges who made the first set of comparisons were secured. Table IV indicates the results:

TABLE IV.

73%	of the judges	ranked sample	2	T 6.5	as better	than sample	116
90%	" " "	" " "	"	111.	" " "	"	T 8.6
90%	" " "	" " "	"	T 10.5	" " "	"	111
63%	" " "	" " "	"	108	" " "	"	T 10.5
80%	" " "	" " "	"	T 13.5	" " "	"	104
80%	" " "	" " "	"	101	" " "	"	T 13.5
70%	" " "	" " "	"	T 14.4	" " "	"	101
80%	" " "	" " "	"	T 16	" " "	"	105
70%	" " "	" " "	"	102	" " "	"	T 17

Reducing these per cents. to differences expressed in terms of the unit difference, or that detected by seventy-five per cent. of the judges, we have the results indicated in Table V.

From Tables III and V the final scale as given in Table VI was derived. In many cases a combination of differences indicated in Tables III and V was used in fixing the value of any given sample on the supplementary scale.

¹ E. L. THORNDIKE. *The Measurement of Achievement in Drawing*. Teachers College Record, November, 1913, p. 25, Table 4.

² T 6.5 means the sample on the Thorndike Scale having a value of 6.5.

³ Odd per cents. are due to some judges giving the samples equal rating.

TABLE V.

Sample T	6.5	is	.9	units better than sample	116
"	111	"	1.9	"	"
"	T 10.5	"	1.9	"	"
"	108	"	.5	"	"
"	T 13.5	"	1.2	"	"
"	101	"	1.2	"	"
"	T 14.4	"	.8	"	"
"	T 16	"	1.2	"	"
"	102	"	.8	"	"
					T 8.6
					111
					T 10.5
					104
					T 13.5
					101
					105
					T 17

The reader should bear in mind that the number of judgments upon which the foregoing tables are based is insufficient for accurate scientific work, but for obtaining approximate values for supplementary points on a scale already constructed the writer believes the results obtained are reasonably adequate.

TABLE VI.

The Supplemented Scale as Used.

Sample	Value	Sample	Value	Sample	Value
T 0.	0.0	106	8.0	T 13.5	13.5
T 2.4	2.4	T 8.6	8.6	101	14.0
T 3.9	3.9	111	9.3	T 14.4	14.4
116	5.5	T10.5	10.5	105	15.2
T 5.7	5.7	108	11.0	T 16.	1.0
T 6.5	6.5	T11.8	11.8	T 17	17.0
107	7.2	T12.6	12.6	102	17.6
T 7.8	7.8	104	13.0		

The objection may be raised that this scale has too many fixed points. Those who used the supplemented scale report that a variety of samples of approximately equal value aids greatly in rating drawings. Both the Thorndike and Ayers writing scales make use of this principle by providing three samples under each quality on the scale.

There are still lacking samples of the general scale in the units 1 to 1.99, 2 to 2.99, 3 to 3.99, 4 to 4.99, and 12 to 12.99.

A FURTHER REVISION OF THE SCALE.

Because of this lack of samples in the lower range of the scale and because of some criticisms made relative to the values assigned to samples 107 and 108, the following supplementary comparisons were made subsequent to the completion of the tests in systems A and B. Eleven judges compared samples T10.5, 108, 104, T13.5; ten judges compared samples 107 and T8.6; and twelve judges compared samples A, B, C, with 116.

Results of the Supplementary Comparisons

(1).	82%	of the judges rated	108	as better than T	10.5
	64%	" " " "	104	" " "	108
	55%	" " " "	T 13.5	" " "	104

Combining these judgments with those of Tables II and IV we have the following:

73%	of the judges rated	108	as better than T	10.5 or	.9 better
86%	" " " "	104	" " "	108	1.6
67%	" " " "	T 13.5	" " "	104	.7

These combined comparisons still give 104 approximately its former relative position with respect to T13.5 and T10.5, its value being reduced to 12.9, but the position of 108 is changed from .5 to .9 better than T10.5 and is thus given a value of 11.4.

What effect would these new values of 104 and 108 have upon the results from systems A and B? Whether the exact or unit group averages be taken, the surface of distribution more nearly approaches the normal probability surface in the ranges of the scale below 6 and between 11 and 14.

(2). 60% of the judges rated T8.6 as better than 107 or .4 better.

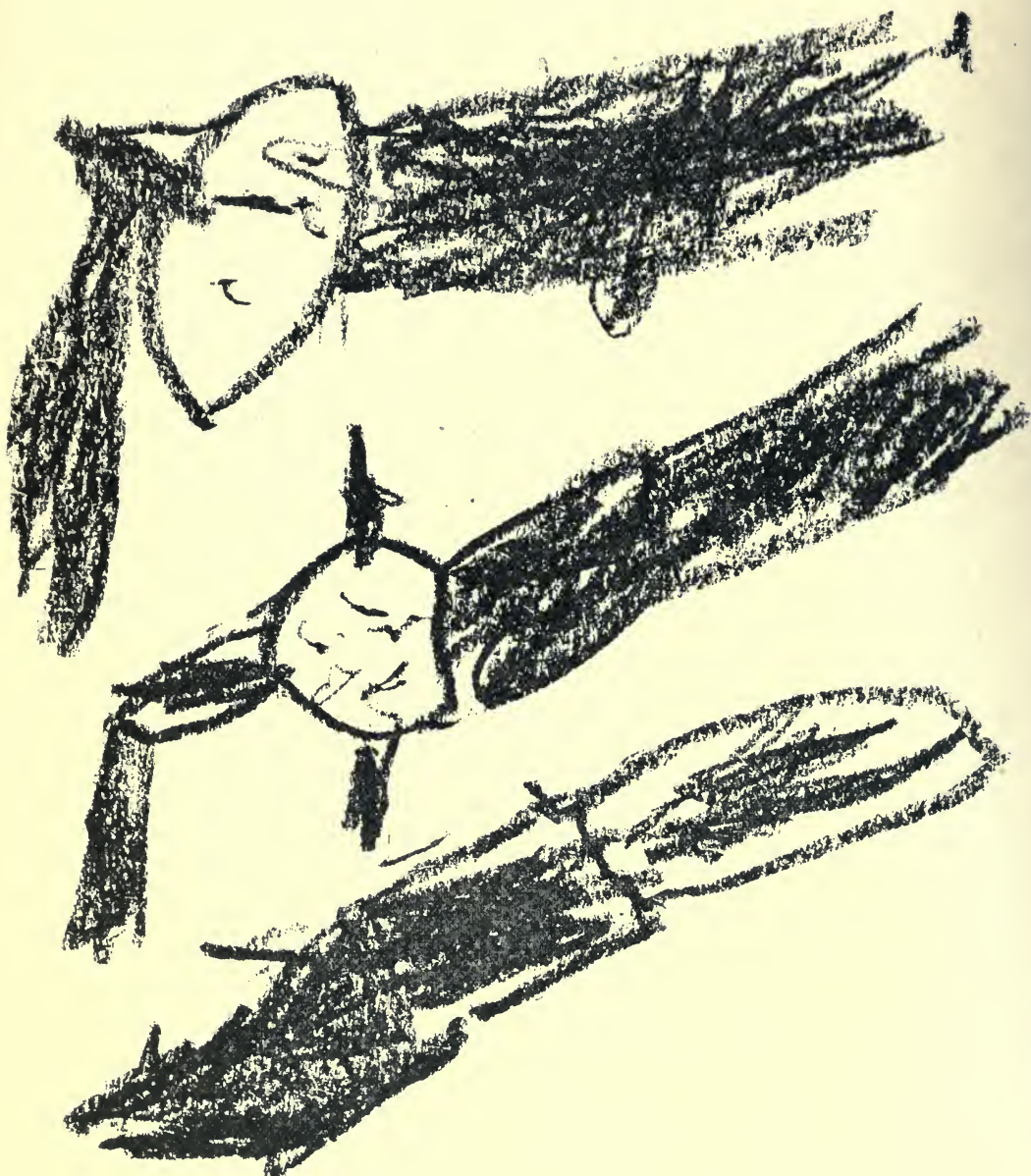
This gives 107 a value of 8.2. Combining this with the value 7.2 assigned as the result of comparisons between 116, 107, and T6.5, Tables III and V, a resultant of approximately 7.6 represents the new value for 107. If we substitute this value for sample 107 and reject sample 106 (value 8) from our scale, the results found in systems A and B will not be appreciably changed.

(3). Samples A, B, and C, together with several others, were chosen by the writer from the poorest drawings in system A for comparison with sample 116, the lowest on our supplemented scale.

75%	of the judges rated	116	as better than C or	1.0 better
92%	" " " "	116	" " " B	2.0
100%	" " " "	116	" " " A	3.5

As a result of this comparison samples A, B, and C, given below, are recommended for use with values of 2.0, 3.5, and 4.5 respectively.

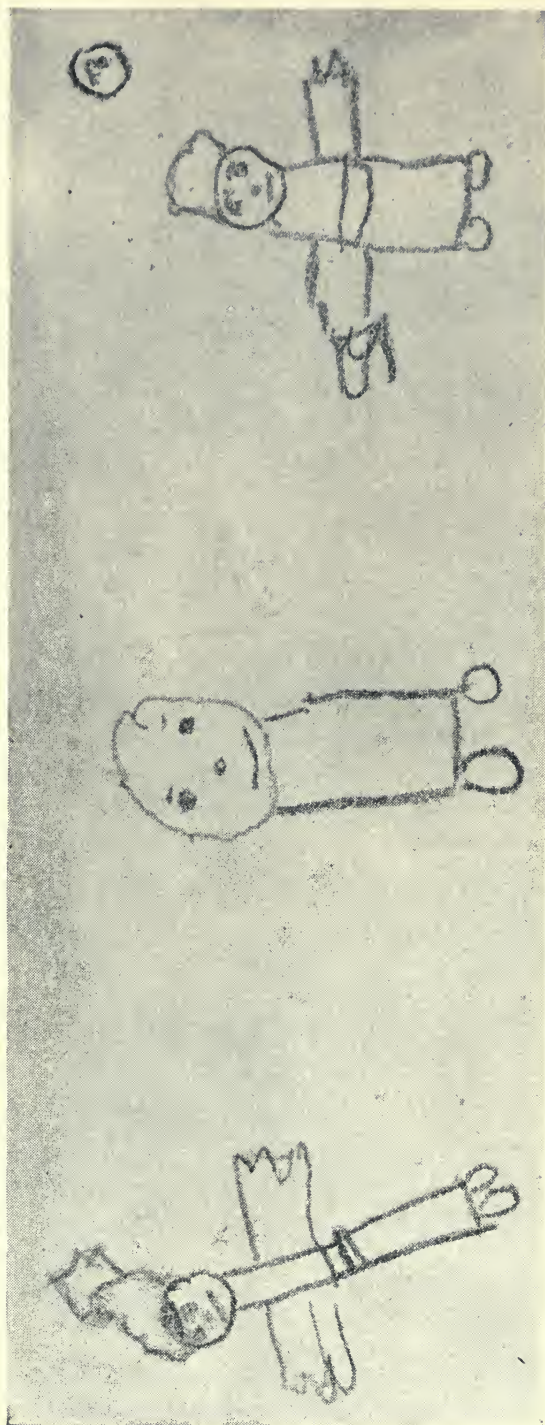
The following scale is suggested for rating drawings of snow scenes with human figures in action. With one or two exceptions this is a scale of approximately unit differences, and includes all the human figure samples of the original Thorndike scale.



Sample A - Quality 2.0

Sample B

Quality 3.5-



SAMPLE C.—QUALITY 4.5

Peter Sandiford

TABLE VIa

Sample	Value	Sample	Value	Sample	Value
T O	0.0	T 6.5	6.5	104	12.9
A	2.0	107	7.6	T 13.5	13.5
B	3.5	T 8.6	8.6	T 14.4	14.4
C	4.5	111	9.3	T 16	16.0
116	5.5	T 10.5	10.5	102	17.6
		108	11.4		

METHOD OF CONDUCTING AND RATING THE TEST.

The drawing exercise was given to one thousand four hundred and five pupils in the elementary schools of system A on February 16 and 17, 1914, and to two hundred eighty-five pupils in the high school, May 26, 1914. As the high school seniors were excused from attendance at this time, this study shows very limited data from them. The test was given to four hundred eighty-seven pupils in one school of system B, April 11, 1914. In system A the exercise was conducted directly by my students in some cases and more frequently by the teacher regularly in charge of the class. In every case the following directions were observed.

In the school of system B the same directions were given under the direction of the drawing supervisor and the teacher.

Directions

1. Materials:
White drawing paper, 6 x 9, drawing pencil, charcoal or crayon-black only.
2. Preliminary data on the back of the sheet.
City, school, teacher, pupil, grade, age (years only), date.
3. Ask pupils to do the best they can and not to hurry.
4. Subject:
Scene or picture with snow on the ground and boys or girls doing something as snowballing, coasting, etc.
5. Be sure pupils understand just what they are to do and the time they are to have for doing it.
6. Time:
Ten minutes, exclusive of all directions and recording of preliminary data.
7. Collect papers; tie papers of each grade in a package and label with subject, city, school, teacher, and grade.
8. No assistance shall be given any pupil aside from interpreting the instructions and helping to fill in the data on the back of the sheet if necessary.
9. Distribute materials before giving the directions to the pupils.
10. Teachers are not to know in advance the nature of the test to be given.

All papers were rated by my pupils in administration, five in number, the papers being so assigned that the final rating of any grade represented the composite judgment of at least three of the judges and generally four. Each paper was rated by two judges and the ratings averaged.

My instructions to the judges were to determine how well the pupil had done what he was directed to do: viz., to draw a snow scene with human figures in action. The suggestion was made that emphasis should be placed as follows: human figure and action, grouping, landscapes, houses, trees, etc. The scorers were asked to judge largely on the representative features of the drawing.

CONDITIONS UNDER WHICH DRAWING IS GIVEN IN THE SCHOOLS TESTED.

During the year 1913-1914 the schools of system A had no drawing supervisor, the work being carried on by each teacher from outlines previously used. It should be noted that previously to this year the drawing had been supervised. The time given weekly varied from thirty to seventy-five minutes, but fifty and sixty minutes per week seemed to be the length of periods most frequently found on the programs.

In the departmental grades (6A to 8A) and in the high school no time was given to drawing as such.

In system B about ninety minutes per week were devoted to drawing in grades 3A to 8A and seventy-five minutes per week in grades 1B to 3B.

The work was well supervised.

THE RESULTS.

The results can be most adequately represented by the tables of distribution, the curves of progress, the central tendencies, and variabilities by grades.

In tabulating results, the exact averages of the two judges on any given paper were not taken, but merely the unit group within which the average fell, e. g., a paper rated 7.2 and 8.0 was assigned to the 7 to 7.99 group.

TABLE VII
Distribution of Drawing Ability—System A, 1690 pupils

Score	Number of Pupils by Grades														Percent of Pupils Receiving Each Score	High School					Percent Receiving each Score
	1B	1A	2B	2A	3B	3A	4A	4B	5A	6A	7B	7A	8B	8A		9	10	11	12	Total	
0	1		1			1									.07	1				1	.35
1 to 1.99	1		4			1									.21	1				1	.35
2 to 2.99	2					1									.50	0				0	0
3 to 3.99	13	16	18	5		3				1		1			4.05	3				3	1.05
4 to 4.99	17	7	7	3		2	1			0		0			3.00	1				1	.70
5 to 5.99	11	16	14	3		10	1			3		2			5.20	5				5	3.51
6 to 6.99	27	34	18	23	14	18	15	6	13	6	3	2	5	1	14.09	6	8	3		17	5.96
7 to 7.99	8	22	7	30	25	39	33	10	12	12	7	39	23	17	17.30	18	14	11	4	43	15.09
8 to 8.99	6	19	12	33	39	40	23	57	48	42	13	31	9	6	32.88	20	32	27	0	83	29.12
9 to 9.99	1			2	7	7	7	13	10	9	13	34	8	13	10.03	19	18	20	0	57	20.00
10 to 10.99				1	3	3		5	8	17	31	7	1	5	9.89	11	12	15	2	40	14.00
11 to 11.99							2	2	0	5	1	1	0	1	1.07	5	4	6	1	16	5.61
12 to 12.99							1	1	0	3	1	3	4	1	.57	2	2	2	2	6	2.11
13 to 13.99									0	3					.78	3	2	1		6	2.11
14 to 14.99									1	2			3		.36					6	2.11
15 to 15.99																				6	2.11
Total	87	115	81	100	94	124	79	95	104	90	85	71	53	50	100.00	95	95	88	7	285	100.00
Median	5.91	6.56	5.78	7.50	8.06	7.69	7.73	8.54	8.17	8.56	10.06	8.67	8.96	9.00		8.65	8.72	9.00	8.75	8.80	
P. E.	1.17	1.11	1.54	.86	.76	.85	.66	.18	.13	.68	1.07	.55	.72	1.01		1.25	.95	.97	1.09	1.04	

TABLE VIII
Distribution of Drawing Ability—One School of System B. 487 Pupils

Number of Pupils by Grades																			
Score	1B	1A	2B	2A	3B	3A	4B	4A	5B	5A	6B	6A	7B	7A	8B	8A	1-8	Total	Percent. of Pupils Receiving Each Score
	0.....						1	1									1				.21
1-1.99.....		1	1				0	1									1		.21
2-2.99.....		12	2				1	0									4		.82
3-3.99.....		9	4				3	0									18		3.69
4-4.99.....		15	8				0	0							1		15		3.08
5-5.99.....		2					0	0	1		1	4	0	2			39		8.01
6-6.99.....		1	14	9			9	5	2	4	0	3	4	4			70		14.37
7-7.99.....			7	8			5	7	9	11	13	4	0	8	1	2	104		21.35
8-8.99.....			2	2			8	7	15	14	18	10	19	16	13	3	139		28.54
9-9.99.....				3				4	3	3	4	2	8	3	5	6	57		11.70
10-10.99.....									1	1	1	2	2	2	1	7	20		4.11
11-11.99.....												2		2	1	3	9		1.85
12-12.99.....												1		1	0	2	4		.82
13-13.99.....												1		1	1		5		1.03
14-14.99.....																1	1		.21
Total.....	0	40	38	22	29	35	27	27	31	38	37	37	31	40	29	26	487	100.00	
Median.....		4.83	6.32	7.31	7.64	7.27	7.00	7.71	8.27	8.32	8.28	8.80	8.74	8.34	8.54	10.36	7.92		
P. E.....		.89	.82	.66	.77	.76	.98	1.03	.61	.73	.56	1.05	.49	.78	.63	1.12	1.09		

Below is given a summary of the combined results of Tables VII and VIII.

TABLE IX

Summary of Tables VII and VIII.

Grade.....	1B	1A	2B	2A	3B	3A	4B	4A	5B
Median Score.....	5.5(?)	6.1	5.95	7.46	7.96	7.60	7.54	8.35	8.20
Grade.....	5A	6B	6A	7B	7A	8B	8A	All	
Median Score.....	8.36	8.48	9.68	8.69	9.28	8.81	9.47	8.09	

From this it would seem that no distinctive norm can be established for each grade, but rather by groups as indicated below.

TABLE X.

Group	Grades	Characteristic Scores
I.	1B	4.5 (?), 5.5
II.	1A, 2B	5.5, 6.5
III.	2A, 3B, 3A, 4B	7.2, 8.0
IV.	4A, 5B, 5A, 6B	8.0, 8.6
V.	6A, 7B, 7A, 8B, 8A	8.6, 9.3

8 to 8.99 is the modal score (the one most often made) by pupils from the 4A to 8A grades inclusive.

No doubt a few periods of practice upon the type of drawing represented by this scale would yield higher scores in all grades if tested by the scale.

ADVANTAGES AND LIMITATIONS OF THE SCALE IN ACTUAL USE.

There is no longer any serious question as to the advantages of objective scales for measuring school achievement. Repeated trials have demonstrated that such scales limit the subjective factor in judgment and narrow greatly the range of variability in rating achievement.

It seems to the writer also that it is desirable that the teacher or supervisor of drawing know what quality of achievement the pupils of any grade should attain, e. g., that pupils of the 1B grade should draw snow scenes with action equal in quality to sample 116, and in grade 3B equal to sample 106, etc.

On page twenty-nine of *The Teachers College Record* for November, 1913, Professor Thorndike indicates the most obvious limitation of the scale, viz., that it does not admit of easy and accurate comparison of all types of drawings. This can be remedied only by devising a series of scales covering the various types of drawing, such as human figures, animals, landscapes, flowers, designs, etc.

Curve of Progress in drawing ability, based on Tables VII and VIII.

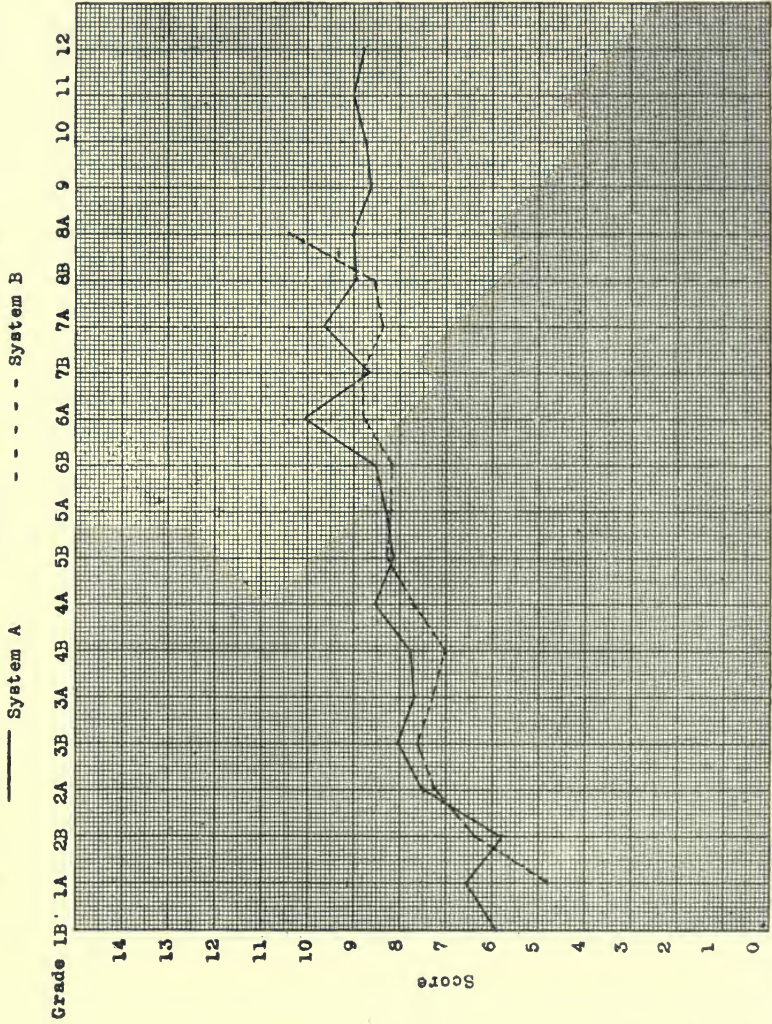
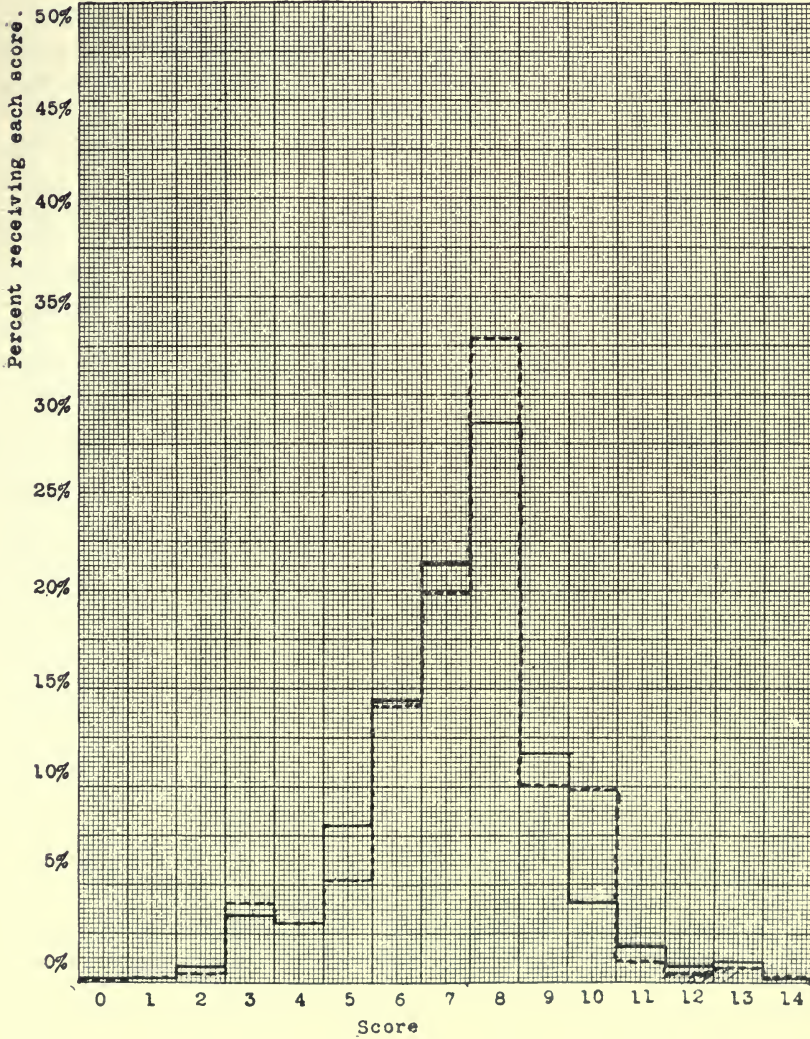


Table XII. Distribution of drawing ability. - - - System A
 Based on tables VII and VIII _____ System B
 All grades 1 to 8.



Teachers and supervisors in the schools where these tests were given protested that it was unfair to judge the quality of drawing achievement by a scale based upon a type of drawing which was given but little emphasis in their courses of study. Landscapes and object drawing receive much attention in most systems, but the landscape effects in the Thorndike scale below quality 14.4 are so crude as to afford but little basis for comparison. This feature in the drawings of systems A and B was very pronounced. Landscape effects, even, with lower grade children, often compared favorably with the best on the scale, but the figures were inferior.

Many pupils would, no doubt, have made a higher score if the time had not been limited. This objection applies to the conditions of administering the test and not to the scale itself. Here, as in any other field of human achievement, efficiency must be measured both in terms of product and time. Just where to strike the balance must be determined by experimentation.

Another limitation of the scale already referred to is that the scale has no snow scenes with action of quality, 2 to 2.99, 3 to 3.99, or 12 to 12.99, and no samples of any sort, 1 to 1.99 or 4 to 4.99. As a result there are fewer ratings of 4 to 4.99 than there are of 3 to 3.99, whereas a normal distribution of ability should give more. In like manner there are more ratings of 13 to 13.99 than of 12 to 12.99, which should not be with a normal distribution of ability. For verification of the above facts consult Table VII. This shortcoming of the scale may be improved by the use of the scale suggested in Table VIa.

SUGGESTIONS PERTAINING TO THE USE OF THE SCALE AND THE INTERPRETATION OF RESULTS.

Those interested in using the scale will find it helpful to sort the papers to be rated into piles such that the papers of any one pile shall be of approximately equal value and perceptibly different from those of the piles of nearest value. This provides the reader with a double set of comparisons; first, of drawings with each other; and second, of each with the standard scale. Then, too, one can work more rapidly, having to use but a limited range of the whole scale in rating any one pile or sample. If teachers are encouraged to use the scale to measure the prog-

ress of their pupils from time to time, more definite standards of achievement and progress will result. Supervisors will find it advisable to do some preliminary work with teachers in the use of the scale. This can best be done with a few selected drawings by calling the teachers' attention to the features to be emphasized in the scale and the drawings. Practice will naturally lead to facility in the use of the scale.

Smoothness of the curve and a marked rise at its end, together with a greater range of gain during the eight years and a smaller range in variation of the product of each grade, are indicative of good supervision. These features are clearly apparent in the curves and table of distribution of system B. The curve of system A is characterized by more ups and downs and a decline from the 6A level of achievement to the end. The range of progress from the 1A to the 8A grades is 2.44 units as compared with 5.53 units in system B, and from the 1A to the 6A grades, 3.50 units as compared with 3.97 units in system B. Systematic supervision, no doubt, accounts for much of the difference found in the two curves of progress. It might be noted, however, that the actual achievement in system A is slightly above that in system B in nearly every grade from 1A to 8B.

Our tables of distribution and curves show that the average child develops more ability in drawing before entering school at the age of six or seven years than he does in the entire eight years of his elementary school course. This statement is based upon the data of Table VII and the fact that 1B drawings were made within four weeks of the beginning of the term.

In both curves the long plateau subsequent to the level reached in grade three is clearly noticeable. This is completely in accord with the studies of children's drawings by Barnes, Lukens, Burk, and Götze, who report a plateau of non-development from the ages of nine or ten on to adolescence.

In the light of these studies and the development of the same fact by the use of the objective scale, it seems pertinent to inquire whether our administrative practice is sound in assigning the same time to drawing in grades four and five as in earlier or later grades where natural development seems to be more marked. In a system having three or four sections each in the fourth and fifth grades, why not assign one section thirty minutes weekly for drawing, another sixty, another ninety, another one hundred

twenty? By adequate testing at the beginning and end of a half year or a year, the progress of each group may be determined.

If thirty minutes weekly produces as good results as ninety, why not assign drawing a minimum of time during these years and appropriate the extra time, now generally given to this subject, to other subjects in which experience has shown that pupils do make rapid progress with the added time? To quote the late Professor James: "Strike while the iron is hot."

Present achievement should be determined by the supervisor for the purpose of planning future improvement. Tables of distribution and curves of progress should stimulate the supervisor to prevent relapses and to eliminate plateaus, to keep the curve ever slanting upward.

The limited findings of this study should not be considered as establishing norms of ability in drawing because they represent only one phase of drawing achievement in a very limited number of schools. These findings are not intended to be final or conclusive in any respect, but it is hoped that these results may be suggestive and helpful to other teachers as to methods of experimentation and as a basis for comparison of achievement.

ATTITUDE AS A DETERMINANT IN SPELLING EFFICIENCY IN IMMEDIATE AND DELAYED RECALL

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I. INTRODUCTION

Random information in and out of school points to increased orthographic viciousness. No inconsiderable percentage of university students, with duly attested credentials from accredited secondary schools, present in their written reviews and examinations, models of inaccurate spelling. Various reasons are assigned for this increased deficiency, chief among them being the enrichment of the elementary and secondary programs and the consequent shortening of the time devoted to spelling. Elimination of new subjects, introduced through social necessity, in the interest of spelling is impossible because such subjects represent this generation's advances and needs. If educational procedure is to avoid over-taxation of children and at the same time insure the learning of an increased bulk of information, it appears imperative that educational practice should improve the teaching technique on the one hand and devise more economic methods of learning on the other. The child of the present must learn more economically.

General denunciation, now prevalent, of the inconsistent and irrational forms of the English language by no means meets the difficulty, but may, by the overzealous "confound confusion."¹ It would seem that improvement in the technique of spelling resulting in greater efficiency and economy in learning offers a desirable auxiliary to conservative orthographic reform.

¹The *Unpopular Review*: "Az tu the long sowndz, the oonly way tu reprezent them, whair thay ar not determind by pozishon at the end ov an oopen silabl, iz (az allreddy illustrated) by combining the letz with different letz, az we combiin in gain, real, mine, soar, rule; evidently gan, rel, min, sor, rul, woud not answer the purpus."

No doubt orthographic reform in the way of elimination of useless letters is the shortest cut toward greater accuracy. But complete simplification to a pure phonetic basis is doubtful economy. Confusion and inconsistency are not eliminated by drastic phonetic reformation. The direction and extent of the reformation is evidently the task of the philologist; improvement in pedagogical technique would seem to be the domain of the educator. That the task of verbal simplification will be left to the philological expert and that the educator will confine his activity to the development of principles underlying the technique of spelling is asking too much of an age yet two-thirds scornful of expert guidance.

II. PURPOSE

The following observations of a six and one-half year old boy is an attempted analysis of certain factors in orthographic technique present in a child's initial spelling work. It should be said that the boy tested out seven and one-half years, according to the Binet-Simon test, and that he is now spelling with reasonable ease the ordinary list of words found in Jones's Third Reader. It should be added that less time was devoted per day than is usually given to exercises in spelling in the primary grades of the public schools.

The purpose of the experiment is to determine: (a) whether pupils in their initial spelling work should be permitted to form a general attitude toward a group of assigned words, or, (b) whether an independent specific attitude toward each word of a group should be developed. The characteristic feature of "a" consists in a definite spacial and temporal relation of the words of an assigned lesson. What is the recall value of such a procedure as compared with a procedure in which each member of a group of assigned words is relatively independent of any such spacial and temporal orders?

Points "a" and "b" above may be illustrated by the following list of words:

- | | | | | |
|-----------|---------------|------------|----------------|-----------|
| 1. missed | 3. jackstraws | 5. kennel | 7. photographs | 9. march |
| 2. smell | 4. evening | 6. dominos | 8. kingdom | 10. games |

It is obvious in the above list of words, as in any ordinary formal group of words found in our common school readers,

that the group associates and the spacial order of the words are entirely accidental. There is no reason why any other order or any other words of equal difficulty might not with equal propriety and educational value be chosen. Of what advantage or disadvantage are the accidental features of a given list of words in recall—immediate, temporary, or permanent? It is probable that each grouping in a given list of words has the same recall value as any other possible grouping of this list. It is probable, too, that any grouping whatsoever has only a temporary recall value. The fact that “missed” has the top space relation to “smell” has little, if any, permanent recall value, for the use of either word in meeting future situations may never involve the other in just this relationship. But experiment shows that this relationship has a temporary functional value in recall. What is true of the spacial order holds equally for the temporal order—both orders constituting accidental features in memorial imprinting and subsequent reproduction.

III. EXPERIMENTAL DATA

The groups of words employed in this experiment are found in Jones's *Second Reader*. Not more than one group was assigned for any one lesson whether the group contained many or few words. In the first lesson the order given in the reader was followed in the assignment, in the study period, and in recall. On page 10, for example, the following group of words is found:

- | | | |
|--------------|---------|-----------|
| 1. bumblebee | 3. din | 5. purple |
| 2. boom | 4. need | 6. rover |

According to the first procedure the words are assigned, studied, and recalled in the order indicated by the prefixed numbers. In the second lesson the words were considered during the assignment and study period in promiscuous order and recalled in chance order. The third lesson proceeded as in the first, the fourth as in the second, and so on through the reader. Close supervision during the study period insured the maintenance of these conditions. In the first case the procedure may be termed orderly assignment, orderly study, and orderly recall; in the second case the procedure is random assignment, random study,

and random recall. The latter procedure more nearly parallels conditions of recall operative under actual situations of life. Obviously orthographic recall in actual situations has neither spacial nor temporal references such as are found in the former procedure.

One group of words was taken per day and at approximately the same hour. Upon completion of the reader the words were again recalled under similar conditions, but this time without previous study. Each group of words was twice recalled: first, immediately upon completion of the study period; second, subsequent to the completion of the text. Before taking up a new group of words the learner was required to reproduce correctly all of the words of a given group. Consideration of an assignment was complete upon the first correct reproduction of the entire list of words.

With words of the chance order grouping, attention was occasionally centered in a conversational way upon the importance of learning the words for "all time." Even at this early age some degree of attention to permanent retention appeared awakened in the mind of the learner, and it is not improbable that the effect of this attitude, however indefinite, manifested itself in greater efficiency in the reproductive process.

IV. RESULTS AND DISCUSSIONS

A total number of one hundred four groups of words were studied (Table I), fifty-four according to orderly procedure and an equal number according to random procedure. The following statements briefly summarize the results:

(a) *In Immediate Recall*

1. Total number of errors for all groups of words.....	73
2. Number of errors when the procedure is orderly.....	33
3. Number of errors when the procedure is random.....	40
4. Excess of errors of "3" over "2".....	7
5. Percentage advantage of "2" over "3".....	9.4
6. Average words wrong 0.1; P. E. .07.	

(b) *In Delayed Recall*

1. Total number of errors for all groups of words.....	249
2. Number of errors when the procedure is orderly.....	145
3. Number of errors when the procedure is random.....	104
4. Excess of errors of "2" over "3".....	41
5. Percentage advantage of "3" over "2".....	16.4
6. Average words wrong 0.31; P. E. .11	

(c) *Comparison of (a) and (b).*

1. Total number of words constituting the experiment.....	808
2. Total number of groups of words (separate lessons).....	104
3. Errors in delayed recall times greater than in immediate recall (orderly procedure).....	4.33
4. Errors in delayed recall times greater than in immediate recall (random procedure).....	2.6
5. Relative advantage of the random method times that of the orderly method	1.73

In the case of immediate reproduction, the orderly procedure is more efficient by 9.4% than the random procedure; in the case of delayed recall the efficiencies of the two methods are reversed—the random exceeding that of the orderly procedure by 16.4%. The advantage of the random method over that of the orderly in delayed recall as compared with the advantage of the orderly method over that of the random method in immediate recall is not adequately represented by the absolute values standing for the respective advantages of the two kinds of recall. Relatively, 1% advantage of the 16.4% has a higher practical significance than 1% of the 9.4% in so far as the former represents fairly permanent mental acquisition. The superiority of the orderly method in immediate recall is in large part due to the functional participation of accidental factors in perception. Chief among such factors are the spacial and temporal arrangements, which happen to prevail, in a given group of words. The superiority of the random method in delayed recall is in large part due to the fading away of the accidental factors which accompany the original learning according to the orderly method. These factors apparently serve an immediate need, then fade rapidly and almost wholly fail to function in delayed recall. According to the random method no such artificial crutch attends the original learning and therefore reproduction remains unaffected by its absence in delayed recall.

V. OBSERVATIONS AND CONCLUSIONS

From the foregoing the assignment of a spelling lesson and the study period gain enormously in importance. The results of the experiment show that a part of the time of an assignment should be devoted to the prevention of the formation of fixed spacial and temporal arrangements of the words of a lesson. Such arrangement can serve no useful purpose in future recall. When, for example, an assignment is made in general terms

TABLE I.

No. of Group	No. of words in group	No. of mis-spelled words in group—1st attempt, immediate restoration	Per cent. of errors in group—immediate restoration	No. of mis-spelled words in group—delayed recall	Per cent. of errors in group—delayed recall
1	5			2	40
2	5	1	20	2	40
3	6			2	33
4	6	1	20		
5	5	1	20	3	60
6	7			1	14
7	12	3	25	4	32
8	5			2	40
9	5	1	20	2	40
10	5			1	20
11	7	1	14		
12	7	2	28	3	43
13	4			1	25
14	7	1	14	2	28
15	5			2	40
16	7	2	28	2	28
17	3				
18	4			1	25
19	6	1	16	3	50
20	10	1	20	2	40
21	2			2	100
22	5	1	20	1	20
23	3			1	33
24	6	1	16	2	33
25	7			3	43
26	6			1	16
27	8	2	24	2	24
28	6			1	16
29	10	1	10	4	40
30	11			2	18
31	9	1	11	4	44
32	10	2	20	2	20
33	8			2	24
34	7				
35	7			1	14
36	7	1		2	28
37	3			1	33
38	8			1	12
39	6	1	16	1	16
40	8	1	12	2	24
41	5			1	20
42	5			1	20
43	11	2	18	5	45
44	6			1	16
45	2			2	100
46	8	1	12	2	24
47	10	1	10	4	10
48	4			1	25
49	3			1	33
50	12	2	16	1	8
51	10	1	10	4	40
52	7	1	14	3	53
53	5			3	60
54	8				
55	12	2	16	4	33
56	10	1	10	5	50

(TABLE I—*Continued.*)

No. of Group	No. of words in group	No. of mis-spelled words in group—1st attempt, immediate restoration	Per cent. of errors in group—immediate restoration	No. of mis-spelled words in group—delayed recall	Per cent. of errors in group—delayed recall
57	10			4	40
58	13	4	31	3	22
59	10			3	30
60	7	1	14	3	43
61	8	1	12	2	25
62	5			1	20
63	11			2	18
64	6			3	48
65	7	1	14	2	28
66	6			1	16
67	10	1	10	3	30
68	10			2	20
69	7			2	28
70	9	2	22	3	33
71	10			3	30
72	9			1 (83)	11
73	12	1	8	4	33
74	10	2	20	2	20
75	8			3	37
76	4			1	25
77	13	2	15	6	46
78	11	2	18	6	54
79	10	1	10	4	40
80	11			2	18
81	10	1	10	3	30
82	6			1	16
83	14	3	21	4	28
84	9			2	22
85	9			4	44
86	6			2	32
87	11	1	9	4	36
88	10	1	10	2	20
89	6			3	50
90	7			2	28
91	11			2	18
92	9	2	22	4	44
93	5			3	60
94	3			2	66
95	10	1	10	3	30
96	6	1	16	3	50
97	10			4	40
98	11	2	18	3	27
99	14	1	7	6	43
100	13	2	15	4	31
101	10	1	10	5	50
102	6			3	50
103	5			2	40
104	14	2	14	4	28
808		73		249	

Number of words spelled according to orderly procedure = 410.

Number of words spelled according to random procedure = 398.

Fractions neglected.

Odd numbered groups indicate a general, orderly attitude on the part of the learner. Even numbered groups indicate an individual, random attitude on the part of the learner toward the separate words of a group.

such as "take the group of words at the top of the next lesson" to a class of primary pupils, a group attitude is established in which each of the words stands in a fixed space and time relation. Observation shows that this attitude is, within certain limits, maintained throughout the study period and carried over to the reproduction period. It is believed that the group attitude interferes with the pupil's independent analysis of each word during the study period and with recall during the recitation period. Accurate observational noting under the direction of the teacher is the first effective imprint received by the child. The effectiveness of subsequent impressions during the study period when the direction of the teacher is withdrawn will depend much upon the first impression. The assignment should be made in such a way as to insure specific adjustment to, and accurate noting of, each individual word of the group, dropping away, as it were, from the other words of the group. This may well be done by focalizing the pupil's attention on each separate word but in no particular space order. Moreover, the teacher should insist that no particular order be followed in learning during the study period.

Children, if left to their own devices, learn a series of words according to the order laid down in the text. If recall follows the order of learning, the efficiency for a given recall period is usually high; if the order of recall is varied, or there is no definite order, confusion is introduced and efficiency disturbed. The definite space order scheme has a relatively temporary learning value as is evidenced by the general inefficiency in subsequent reproduction in reviews.

The above list of words was learned in the order indicated by the numerals. When "March" in the reproductive order followed "missed" the pupil was at sea, confused, as is indicated by the statement, "I was thinking of 'smell.'" Obviously we find here the order of learning interfering with the independent consideration of the word "March." This case is typical of a large number of similar observations. It appears that words should be learned at random, that is, independent of all associates other than the phonetic associates, unless such other associates form permanent and meaningful connections. It is clear that "missed" and "smell" form a unique, temporary, and accidental contiguity which can by no means function as an

agent of recall in future situations. Such arbitrary contiguities function positively for a given spelling assignment, but the total final effect is negative in that they interfere with the establishment of clear and definite phonetic connections of the literal elements of a word. In fact, reliance on contiguity acts as a distraction to clear phonetic apprehension.

Observation shows that economy in learning to spell demands that each word be hoisted out of its group setting for the reason already given and for the equally or more important reason that by so doing the literal elements of a word are brought out into clearer consciousness and their phonetic connections established. The importance of raising the sounds and their connections into clearer consciousness by means of the assignment is obvious from the repeated confusion of the letters "m" and "n," "j" and "g," "in" and "m." The word "missed" was studied and reproduced as "nissed"; "jackstraw" as "gackstraw"; "games" as "gains." These cases clearly indicate the necessity of attentive focalization on the structural elements of each word prior to the study period if progress in spelling is to be economic, rapid, and permanent. In this connection it should be remembered that a single focalization by no means establishes the phonetic associates of a given word. Repetitive focalization is best secured by having several pupils successively pronounce and phonetically spell in irregular order the various words of a given group. The profit of the study period is proportional to the care with which this part of the assignment is carried out. It is perhaps safe to say that one-half of the time devoted to second grade spelling should be devoted to the assignment.

VI. SUMMARY.

1. Within the limits of this study a group attitude toward a given list of words is more efficient in immediate and less efficient in delayed recall.
2. An individual, particular attitude toward each member of a group independent of spacial and temporal relations is more efficient in delayed recall and less efficient in immediate reproduction.
3. Whether the orderly or random method is preferable depends upon the end or purpose of the learning. If the end is

a perfect recitation without regard to lasting effect, then the orderly procedure saves time and energy and should be followed; if, however, the end is permanent retention and accuracy in reproduction, then the random procedure should be followed. Here as elsewhere in educational technique the purpose in learning determines the method. A given method of learning may be economical when one effect is desired and uneconomical when another effect is sought.

A STUDY OF INITIAL SPURT IN THE CASE OF ADDITION

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The object of this paper is to present evidence of the existence of initial spurt as a characteristic of mental work of a certain type. This doctrine of initial spurt may be stated thus:—At the very commencement of work, other things being equal, the individual tends to exhibit his maximum efficiency.

This theory has been investigated by many experimenters, who have reached such divergent results, usually negative, that a description of their work would be cumbersome. In Thorndike's recent book,⁵ there is a reasonable discussion of the subject, and the important references are given. A consideration of the complete evidence leads to the conclusion that one cannot be other than extremely skeptical concerning the existence of such a spurt. The subject is usually so mixed up with accidental variations as to make it easy, by selection, to interpret these as a general law. Thorndike seems to think that the attractiveness of the theory has led to a false support.

It appears that the weakness of previous experiments lies in two facts, which sometimes occur singly, more often together. These two weaknesses are:

1. The successive time periods which test the spurt are too lengthy.
2. There is usually a lack of a sufficient number of subjects.

The general explanation of initial spurt would be that the individual commences work with a too exacting standard, only to find in a short time that he is compelled to relax this standard. If this is the case, it would appear that from the point of view of investigating this effect, it is impossible to measure too short periods over which the initial spurt may show itself. It is possible

⁵ *Educational Psychology*. Vol. III. 47, 48 ff.

that this spurt only lasts for two minutes, or a minute, or even less; self observation, on the part of the writer, would suggest that three minutes in typewriting is enough to eliminate the major part of the effect. It is obvious, therefore, that what has to be done is to measure continuous work over a long period divided up into spaces of time as short as possible consistent with having a sufficient score and not harassing the subjects in their work. A balance between these two factors has to be found. An experimenter using ten-minute successive periods as the test of initial spurt may be compared with an engineer measuring the acceleration of a train by computing the distance covered in successive periods of one hour.

Another factor of importance is the number of the subjects employed. The work of three subjects as in the case of Lindley's⁶ experiment, and of one subject in Arai's experiment,⁷ can hardly yield results sufficiently conclusive for the establishment of a general psychological principle. In the work about to be described, an attempt has been made to eliminate both of the weaknesses mentioned.

Forty-six male college students worked at addition of columns of ten one place numbers for ten ten-minute periods. The addition blanks used were those devised by Thorndike.⁸ In the case of each subject the work spread over five days, the two periods each day being separated by a two hours' interval. The test was conducted using four subjects a week, in this manner spreading over a period of twelve weeks. In every case, on a day previous, the test was practised and the routine made automatic. The fact that the test was administered to so few at one time, and that arrangements were made for practice before the actual tests were given will perhaps account for the fact that not a single paper has had to be neglected through lack of obedience to instructions. The results of the previous day were announced, and interest and competition appeared to be at a maximum. The subjects had no idea that the object of the study was to investigate initial spurt.

Seven sheets of these columns of ten one place numbers were used, each sheet containing 48 columns. The various sheets

⁶ *Ueber Arbeit und Ruhe*. Psychologische Arbeiten. Vol. 3, pp. 482-534.

⁷ *Mental Fatigue*. Teacher College. Contribution to Education. No. 54.

⁸ *Practice in Case of Addition*. Amer. Journ. Psych. Vol. 20, p. 364.

were used in rotation. This was necessary to eliminate the possibility of memorizing. The method of conducting the experiment was as follows: after the sheets had been distributed, they were turned face down, at a signal they were reversed, and the subjects commenced to add for a continuous ten-minute period. At the end of each two minutes of that period, the word "mark" was called, at which signal the subjects made a short mark or tick on the right hand side of the problem on which they were engaged. This marking was practised so as not to interfere with the adding, and in working it was found that after a few minutes of practice it became quite automatic. It was hoped that this tick would tell not only the column reached but also the point in the column at which the subject was working when the call was made. This, however, proved not to be the case, since it was found later that some individuals add up the columns and some down, while some add up one column and down the next. The place of the ticks is therefore of no significance apart from indicating the column itself; for this reason allowance has to be made or what may be called the boundary condition. This constituted a correction for the "beginning and end effects." For example, if the first tick came on the right hand side of the x th column, this does not mean that, on the average, x columns have been added, but merely x minus one-half columns; so that half a column is deducted throughout from the first apparent score while three-quarters of a column is added to the last apparent score, for the last score includes one-half of the column on the left hand side of the tick for the fourth period, and an additional correction for the end effect at the close of the fifth and last period. Under ideal conditions, this end effect would be an additional one-half column, beyond the last column completed, for no tick was made at the completion of the ten minutes. In practice, however, the subject who has completed, let us say, half the column when time is called does not cease work instantaneously, but continues for the second or so required to finish that column; only the subjects who have just started the column stop immediately, so that on the average it is probably sounder not to allow half a column but merely a quarter, or possibly less. If the correction is assumed to be three-quarters of a column, the data given in the tables result. The scores are recorded on the basis of columns added correctly, an error in a column simply

means that this column is neglected. Working with subjects of this type, whatever the convention with regard to errors, they are so small in number, as not to affect the topic under consideration.

Using the time distribution previously mentioned it will be seen that each of the subjects is tested on ten occasions for ten minutes, each continuous ten-minute period being divided into two-minute periods, without interfering with the continuity of the work of the ten-minute test. In this way, results are obtained showing the number of columns added during each of the five two-minute periods. Owing to chance variations in each individual score little value attaches to one single score during a single two-minute period; for this and other reasons only the aggregate scores of each subject in the ten-minute periods are given. By adding up the scores of any particular subject, during the first two minutes in all ten tests, an estimate is obtained of the average efficiency of that individual during this first period. In the same way, measures can be obtained of the efficiencies during the second, third, fourth, and fifth periods. In Table I such addition of the scores has been made. The left column indicates the number of the subject, while the five columns record the aggregate score in all the tests during each of the two-minute periods mentioned. The Roman numerals, I, II, III, IV, and V, indicate the scores during the first, second, third, fourth, and fifth two-minute periods respectively.

TABLE I.

Total Scores of 46 individuals in addition for five continuous two minute periods on ten occasions											
Subject	I. Score 0- 2 mins.	II. Score 2- 4 mins.	III. Score 4- 6 mins.	IV. Score 6- 8 mins.	V. Score 8-10 mins.	Subject	I. Score 0- 2 mins.	II. Score 2- 4 mins.	III. Score 4- 6 mins.	IV. Score 6- 8 mins.	V. Score 8-10 mins.
1	139	129	134	131	124	23	143	134	126	126	131
2	136	132	125	125	135	24	132	135	130	121	113
3	249	230	220	215	222	25	129	109	117	110	98
4	134	131	127	114	116	26	95	100	101	104	87
5	201	187	178	177	182	27	233	217	208	206	205
6	137	131	130	119	119	28	172	175	165	170	154
7	225	191	194	181	191	29	164	145	142	147	138
8	123	108	117	120	107	30	161	147	141	126	144
9	127	114	112	117	113	31	158	148	137	150	148
10	192	159	153	158	145	32	87	105	95	85	96
11	131	97	97	94	99	33	141	120	115	118	113
12	141	117	132	117	120	34	101	87	88	83	82
13	263	238	232	231	128	35	89	79	84	80	72
14	182	175	174	178	171	36	218	214	207	204	203
15	175	158	142	132	144	37	121	104	92	87	86
16	228	216	208	199	105	38	217	207	192	192	184
17	100	97	103	97	97	39	164	146	143	144	138
18	111	104	102	91	93	40	187	175	159	169	168
19	104	103	102	98	93	41	203	188	182	182	175
20	174	156	156	148	148	42	146	143	127	122	126
21	178	167	156	164	157	43	157	141	121	129	131
22	137	133	120	126	118	44	149	138	130	135	131
Subject	I. Score 0- 2 mins.	II. Score 2-4 mins.	III. Score 4- 6 mins.	IV. Score 6- 8 mins.	V. Score 8-10 mins.	Subject	I. Score 0- 2 mins.	II. Score 2-4 mins.	III. Score 4- 6 mins.	IV. Score 6- 8 mins.	V. Score 8-10 mins.
	45	158	150	147	139						
	46	236	218	210	205						
Total	7348	6798	6573	6468	6397						

At the foot of the table will be found the grand totals, showing the aggregate work accomplished, during each two-minute period, by the 46 individuals, each working on ten occasions.

In the diagram, Fig. 1, a curve is drawn exhibiting the relation between the order of the two-minute period and the total work accomplished by all the subjects during that period. The curve represents the results corrected for beginning and end effects, according to the convention described.

The curve reveals the undoubted tendency to a greater efficiency during the earlier periods. In the table below, the scores during each of the two-minute periods are shown, the score of the first two-minute period being taken as 100.

TABLE II.

Period	Score
0- 2 min.	100
2- 4 min.	92.5
4- 6 min.	89.4
6- 8 min.	88.0
8-10 min.	87.1

From this table, it will be seen that there is a much greater drop in efficiency from the first to the second period, than from the second to the fifth period, which seems to indicate the presence of a factor which can only be called initial spurt.

These data were collected for other purposes than the investigation of initial spurt effects. Had the latter been the only consideration the total time period would have been longer, so that the subjects might have reached the steady state of efficiency which all other experiments on this subject have revealed. Even in so short a time as ten minutes the curve shows that the decrease in efficiency is rapidly declining.

The subjects were not told, though doubtless in many cases they knew, that the fifth two-minute period was the close of each test: such being the case, these results cannot be used to investigate the problem of "end spurt."

It is interesting to record in what percentage of the forty-six cases, the scores of one particular period exceeded those of the following period. In the table below such results are tabulated.

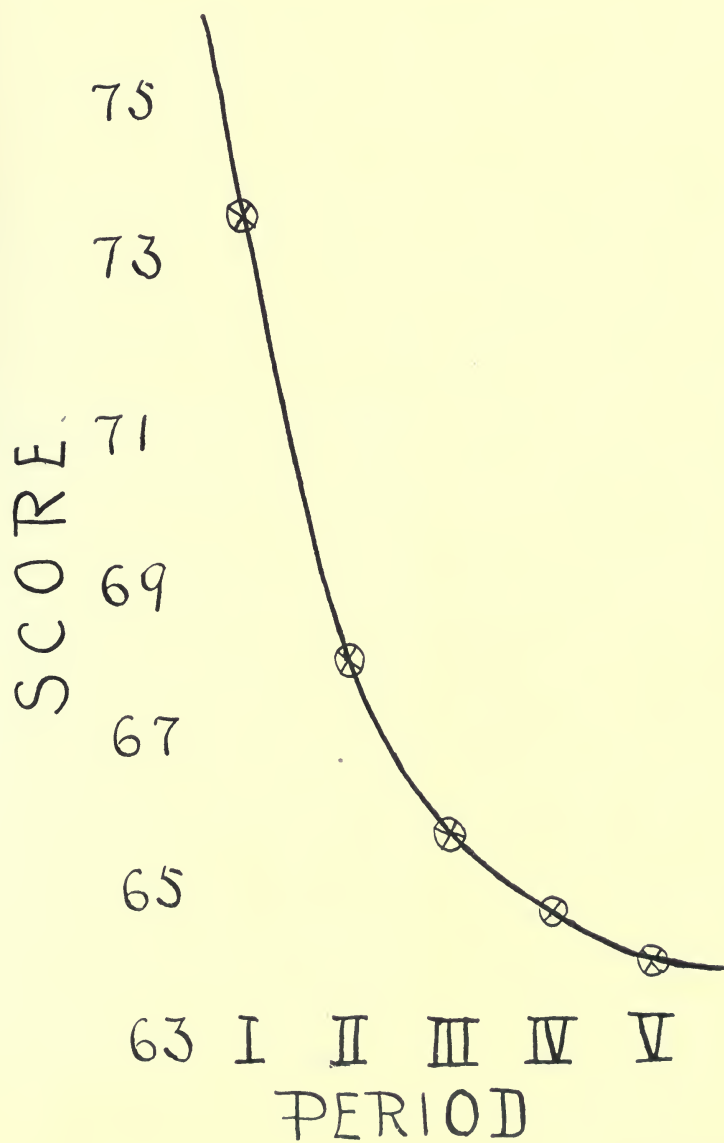


FIG. 1

TABLE III.

Score	I	exceeds score	II	in the case of	91% of the subjects
"	II	"	III	" " " "	76% " " "
"	III	"	IV	" " " "	59% " " "
"	IV	"	V	" " " "	54% " " "
"	I + II	"	III + IV	" " " "	94% " " "
"	I + II	"	IV + V	" " " "	100% " " "
"	II + III	"	IV + V	" " " "	86% " " "

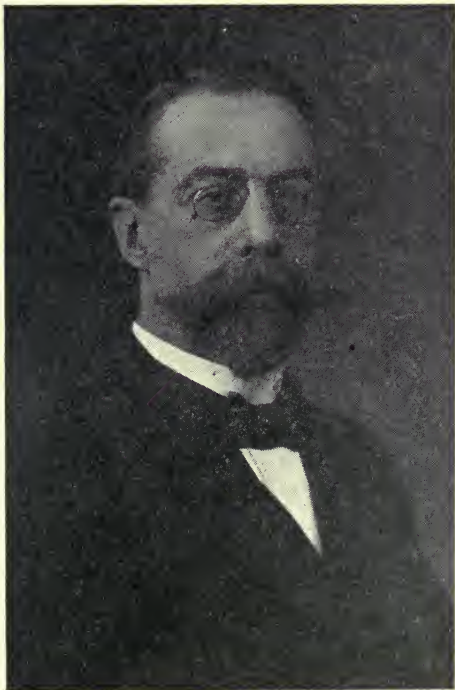
The evidence presented in the case of this particular mental function can only lead to one conclusion, namely, that initial spurt takes place as a general rule in this trait. No explanation on the basis of chance variations will account for the above figures. In such circumstances, however impossible it may be to generalize and predict the presence of initial spurt in all types of work, to dismiss it merely as an attractive theory is to cause greater difficulties than to accept it as a general proposition. The evidence would probably be even more conclusive, were it possible to use shorter periods as the test of initial efficiency. This subject is being further investigated.

My thanks are due to Prof. E. L. Thorndike, under whom this research was performed. I also take pleasure in expressing my obligation to the New York State Ventilation Commission for their courtesy in allowing me to use the data recorded.

COMMUNICATIONS AND DISCUSSIONS

ERNST MEUMANN. AN APPRECIATION

Of late the mortality among psychologists of leading rank has been very high. In the last few years we have lost Ebbinghaus, James, Binet, and now Meumann. And the loss is all the greater in that these men were for the most part in their prime. Thus both Binet and Meumann were just a little over fifty, and Meumann was at the



stage where he was just beginning to avail himself of his extraordinarily wide knowledge of the literature of educational psychology and several more or less remotely allied subjects, such as pure psychology and aesthetics.

In such an article as this I only need to mention his various articles on learning, memory, aesthetics, etc., and his monumental work on experimental pedagogy, the second revised and much enlarged edition of which he had just completed under somewhat hurried and adverse conditions due to the beginning of the war.

His method of writing this second edition was characteristic. As a result of his desire to include everything that had appeared up to the date of publication, he had to do most of his work under hurried conditions, and thus he dictated almost all his material. This accounts for a certain diffuseness of his style. He himself was only

too well aware of this, as was shown by a remark that he once made in rather a hopeless tone of voice, that he would be satisfied if only he could sit down and completely rewrite the second edition without the necessity of including any new material. As another example of his desire for completeness, his review in the *Archiv* of articles on the Binet tests may be mentioned. He actually attempted to read all the articles at first hand in four or five different languages, and he used to shake his head and sigh whenever one of the American periodicals came in with a fresh batch of Binet articles; he had a whole bookcase full of such articles. Of course this desire to include everything carried with it a failure to exercise critical selection in some cases.

Meumann was not only theoretically a pioneer in the new science of experimental pedagogy in Germany, but by his very varied academic career he served to break the ice for the actual practical establishment of experimental pedagogical seminars. Thus in his comparatively brief career he made the following changes, from Leipzig to Zurich, to Königsberg, to Münster, to Halle (as Ebbinghaus's successor), to Leipzig, and finally to Hamburg. In addition to this he gave to numerous teachers' associations throughout Germany series of lectures which formed the basis of his largest work.

As an investigator and student he was an absolutely indefatigable worker, and his early death was in a large measure due to the fact that he did not know how to rest. He was always planning to take vacations, but when the time came round he usually had so many irons in the fire in connection with his many interests that instead of resting he worked all the harder because of the lack of interruption by lectures and class work. Even his one hobby of collecting Oriental carpets was pursued with the same untiring energy. Any one who visited him in his later days will always remember him as working hard to explain the points of difference in the various kinds of carpets, and showing the course of their development with regard to pattern and workmanship.

As a teacher he was unusually stimulating. As one of his students once said, "Meumann could in five minutes propose enough material for two or three doctor's theses on almost any topic in his field." The greatest difficulty that most of his students had was in picking out a sufficiently restricted problem from the wide-reaching suggestions that were made, in order to have even a remote chance of completing the work in the time allowed. This enormous breadth of

view is shown all through Meumann's own work. From his own doctor's thesis on he was always outlining and intending to carry out a far more inclusive investigation than he or any other man could hope to accomplish in a lifetime. But even though he did not himself carry out these proposed lines of research, the outlines for future work constitute his chief contribution to the progress of the new science of pedagogy. He has been accused of scattering his energy over too many and too diverse fields, but in this very scattering lay his chief opportunity for far-reaching influence. His task was to break new ground; it is for those who follow to see that this pioneer work is properly carried out to its logical conclusion.

As a man Meumann was the very essence of courtesy. It was next to impossible to get the better of him in a bout of compliments. When all other resources failed he would come out victorious with the remark "*Ganz auf meiner Seite.*" In spite of the great respect that was paid to him wherever he went he was always modest and unassuming and even tried to place the credit for any work which he himself had done on some one else who had merely taken a collaborator's part. It may be said without any reserve that personally he was a perfect gentleman.

D. KENNEDY FRASER.

Cornell University.

A TACHISTOSCOPE FOR CLASS EXPERIMENT AND DEMONSTRATION PURPOSES.

The need for and value of class experiments in the teaching of educational psychology have frequently been expressed in the pages of this JOURNAL and indications have from time to time been given as to how they may be employed in various spheres. If, however, the range of applicability of class experiments is to be extended, the instruments generally employed in experimental psychology will have to be modified, or new instruments devised.

The value of the tachistoscope in experimental psychology is known to all teachers and students of the subject; but, as the ordinary type can be used only for individual work and the cost of the instrument prevents it from being reduplicated for large classes, the writer has been led to consider whether a new and cheap form, suitable for class purposes, could not be devised.

The contrivance in general use which naturally occurs to one seeking a means of obtaining momentary exposures is the ordinary photographic shutter. The writer conceived that this might be modified to serve the purpose of a tachistoscope. The difficulty which then confronted him was how to obtain a suitable light. In a discussion of this problem with his colleague, Mr. A. H. Jenkins, instructor in Manual Work to the St. Andrews Provincial Committee for the Training of Teachers, the latter suggested the employment of the ordinary magic lantern. It was then evident that all that was required to obtain a tachistoscope for class experiment and demonstration purposes was to affix a photographic shutter, timed for momentary exposures, to the ordinary lantern in use in the college. This was done and the trial experiments made with it were from the very outset quite successful. Slides prepared after the fashion of the ordinary lantern slides served as exposure cards.

The arrangement is now here reported in the hope that others may avail themselves of this means of popularizing the teaching of educational psychology, for although the results obtained by class experiments may not have the scientific exactness attaching to results got by individual investigation they nevertheless carry greater conviction to the student of the subject. The objections that hold against certain forms of class experiment do not obtain in the case of the tachistoscope here suggested; for the time of exposure is determined and there is nothing to prevent the introspections being secured, as the subjects engaged can be allowed time after each exposure to report their introspections in writing. The new arrangement has the advantage over the usual type of tachistoscope employed, in that fifty or a hundred subjects can take part at the same time in the investigation, and reliable averages can be secured; whereas with the ordinary tachistoscope the time taken to do the tests individually usually prevents a sufficient number of subjects being investigated, and, as a consequence, the conclusions drawn from the results may not be reliable.

The new tachistoscope may profitably be utilized for the following purposes, which, while illustrative of psychological problems having pedagogical bearings, are also worthy of investigation on their own account, as there is a reluctance on the part of some writers to accept the present results:—the development with age of the range of attention; the proportion between the types of readers—fixating and fluctuating; the determination of the question whether this classifica-

tion into types holds in the case of school pupils. These problems may suggest others for which the tachistoscope recommended may prove suitable.

No application, it may be added, has or will be made for patent rights in this new form of tachistoscope, so that it is open to teachers of psychology or to makers of psychological instruments to improve and perfect the suggested arrangement. If it is to be characterized by any title, the writer desires Mr. Jenkins's name to be associated with his own and suggests "the Rusk-Jenkins tachistoscope."

ROBERT R. RUSK.

St. Andrews, Scotland.

THE DALLAS INVESTIGATION OF THE TEACHING OF ENGLISH AND MATHEMATICS.

Early in April of this year the Board of Education of Dallas, Texas, decided upon an investigation of the teaching of English and mathematics in the elementary schools of that city. Mr. E. D. Jennings, of the University of Texas, was selected to conduct the investigation, and was requested to make as detailed and accurate a report as possible on the instruction in these subjects in each of the elementary school rooms of the city. Over three hundred teachers were visited personally and their instruction was rated on the basis of a score card previously devised by Mr. Jennings in a survey of the Austin schools. This rating was then checked by the data available in the superintendent's office, and by the results of five tests given to all the pupils (about 8000) at the beginning of the investigation. The tests were as follows: (1) A test of the speed and accuracy of pupils in the four fundamentals of arithmetic (after Courtis); (2) a test in problems involving reasoning (after Courtis); (3) the Buckingham spelling test; (4) the Starch silent reading test; and (5) a composition test, scored with the use of the Hillegas scale. The results of these tests were computed under the supervision of members of the education faculty of the University of Texas. It is to be hoped that the report, or at least those portions of it that are of interest to scientific students of education, will be published.

ABSTRACTS AND REVIEWS

CHARLES HUGHES JOHNSTON, Editor. *High School Education*.
New York: Charles Scribner's Sons, 1912. Pp. xxii, 555.

That Professor Johnston has performed a service to education in assembling and editing this book from which teachers may gain a fresh outlook on their own subjects, and at the same time obtain a perspective of the whole high school curriculum and the possible correlations of various subjects, has been demonstrated by its wide use as a text and reference book.

The strong feature of the book is that it is the first comprehensive treatment of the methods of teaching all the various high school subjects in the curriculum, by a group of men and women who for the most part are particularly well qualified to treat their respective subjects from an empirical point of view. It is most valuable as a reference book on high school subjects for principals and teachers. Of the twenty-six chapters, the first two were written by the editor, who attempted, with considerable success, in addition to giving a general discussion of the current demands upon the program of studies and the disciplinary basis of courses of study, to bring under control the general treatment of each chapter, after the sixth, by means of a common scheme of suggestive questions. In addition to the regular high school subjects are treated the *History of Secondary Curriculums Since the Renaissance*, *Principles and Plans for Reorganizing Secondary Education*, *Instruction: Its Organization and Control*, and *The High School Library*. The appended selected references to each chapter are well chosen and extensive in their range, including author, full title, publishers, volumes, and prices, but not including the dates of publication or, in the case of books, the number of pages.

The marked inadequacies and limitations of the book lie in the multiplicity of writers with their respective methods of expression and points of view, and the consequent lack of continuity from chapter to chapter. Education has suffered materially from the fact that authors or editors are satisfied to throw together a number of essays or papers with different points of view and little or no continuity, and call it a text-book. In medicine some valuable books

have been compiled by a group of specialists, but the number seldom exceeds eight or ten, and the fields of inquiry have been more definite, more limited, with a better organized historical setting, and the discussions have been based on experimental, empirical evidence within the particular field of inquiry.

Distinctive value would have been added to Professor Johnston's book had the contributors been selected and advised to approach their subjects from the standpoints of the *psychology of high school subjects*, and the *genetic phases of adolescent development*, which are entirely overlooked except by Professor Davis on "Principles and Plans for Reorganizing Secondary Education," Professor Elliott on "Instruction; Its Organization and Control," Professor Denney on "English," Professor Sargent on "Drawing," Professor Warthin on "Sex Pedagogy in the High School," and by the editor in Chapter I.

BIRD T. BALDWIN.

Swarthmore College.

CHARLES HUGHES JOHNSTON, Editor. *The Modern High School, Its Administration and Extension*. New York: Charles Scribner's Sons, 1914. Pp. xviii, 847. \$1.75.

This is the second of a projected series of three volumes dealing with various phases of high school activities. The first volume, *High School Education*, "was concerned primarily with the problems of classroom instruction in the different high school subjects and with certain technical matters of administration closely related to these problems." The third is to deal with the problems of high school supervision. The present volume treats the high school as a social phenomenon, as a growth in response to developing social needs, and inquires to what extent the present high school organization meets those needs, and in what way the organization may be modified to meet them in a more satisfactory manner. In the words of the editor, the aim of the book is to present "a survey of policies, examples, and suggestions of ways and means of making *the strictly socializing work of our actual high schools* more definite, more effective, and more nearly universal." The volume represents the combined efforts of twenty-seven authors, and while this involves a certain amount of repetition and some lack of unity in the development of the discussion, the various chapters are well tied together by the central theme, the social function of the high school.

The first of the four parts into which the book is divided deals with the high school as a component part of a complex social organization, and considers it as a social enterprise, as a legal institution, as a business undertaking, as a continuation of the elementary school, as a preparation for higher education, and as an agency for the improvement of the industrial life of the community. In discussing high school education as a social enterprise Dr. Snedden comments upon the evidences of increasing faith in the high school on the part of the public, yet points out that courses of study are still largely traditional or are acknowledged to be makeshifts, and pleads for a reorganization of curricula on the basis of social needs and of extended scientific tests.

Part II treats of such specialized relations of high school work as class management in its relation to the family, the community, and the school subject, the direction of study, school versus home study, the home and school association, and other co-operative agencies of the high school. Of especial interest are the accounts of classes in history and in hygiene in which the pupils were encouraged to assume more and more of the responsibility for the conduct of the recitations and the teacher retired to the background. This is the ideal toward which all teachers should strive, but of which few seem to have any conception, and it will be of great value in the training of teachers to have these concrete cases made accessible. One of the most important duties of the high school is to teach pupils how to study, yet few teachers take the trouble to develop this ability in any systematic fashion. In the two chapters on study the authors summarize the recent extensive discussions of this topic and present new material on the efforts which are now being made to incorporate training in habits of study as an essential part of the school work.

In Part III the internal organization of the high school receives attention, and such topics as the improvement of teachers in service, the social activities of students, athletics, debating, journalism, and fraternity life are discussed. The lack of professional spirit in high school teachers is deplored and suggestions are made for securing broader professional reading, more helpful faculty meetings, constructive class room supervision, the broadening of departmental lines, the introduction of standard scales for rating and promoting teachers, and the arousal of interest in scientific investigations by the teachers themselves. In view of the large number of young and inexperienced teachers that enter our high schools each year it

is necessary that principals, heads of departments, and older members of the faculty assume the responsibility of training the neophytes and setting a high standard for the activities of the teachers. This is the more important because the teachers' previous training has been limited to subject matter, and there has been no contact with boys and girls.

Part IV includes such further problems as the use of the high school as a social center, continuation work, the library, vocational and avocational guidance, co-operation in English, the high school as a community art center, high school hygiene, and the moral and religious life of high school pupils. In these chapters much valuable data has been collected portraying the activities and experiments of the more advanced high schools in the country.

The book as a whole should prove stimulating and suggestive to both principals and teachers and might be used to great advantage by a corps of high school teachers as a handbook for a series of intensive studies of the problems raised.

J. C. B.

PAUL MONROE, Editor. *Principles of Secondary Education*. New York: The Macmillan Company, 1914. Pp. xxviii, 790. \$1.90.

The title of this book arouses expectations which further examination leaves unrealized. One anticipates a systematic and fundamental analysis of the activities involved in secondary education, and the reduction and coördination of its manifold details into a coherent organization according to certain basic ideas. But if, after perusing the volume, one inquires what *are* the principles of secondary education, one is obliged to admit that the whole situation is as confused and chaotic as before. Indeed, from the method of construction of the book it is difficult to see how any fundamental and consistent principles could be developed. Thirty-two different authors contributed to its contents, and many of the chapters represent the combined work of two or three different writers. While each one of these authors has won distinction in his special field, the variety of views presented certainly does not make for unity of treatment, or for the development of principles. The book is rather a brief encyclopedia of secondary education, and it is stated by the editor that the material for some of the chapters was drawn from his large *Cyclopedia of Education*. Perhaps a more descriptive title

would be "Handbook of Current Theories and Practices in Secondary Education."

Let it not be thought that this criticism of the book's title is any reflection upon its value. On the contrary the student of high school education will find information and stimulation in every chapter, and the book will undoubtedly be widely used as a reference work in the training of high school teachers. In the introductory chapter the editor maps out the field of secondary education and presents reasons for the great diversity of aim and procedure found there. The physical and mental changes that take place at adolescence are assigned as important factors in differentiating secondary education from that of other periods, but it is an open question whether these changes have not been greatly exaggerated in recent educational discussions, and whether the transition from childhood to maturity is not much more gradual than we have been taught to believe. Chapters II to IV outline the history and present status of secondary education in Europe and America, and Chapters V and VI discuss the organization and administration of public and private high schools.

It is Chapter VII that the educational psychologist finds of especial interest. In it Professor Whipple gives an excellent brief discussion of the psychology and hygiene of adolescence, taking up the topics of physical growth at adolescence, physiological age, the problems of sex, adolescent organizations and secret societies, pupil self-government, religious and moral development, and the complicated tangle of formal discipline as it applies to high school situations. In treating of physiological age the work of both Crampton and Foster is reported in sufficient detail to show the sharp contradiction in the conclusions of the two investigators, and further study is called for. The student will find in this chapter the best available discussion of the problems of sex hygiene and the teaching of sex in the high school. The Freudian view of the significance of sex is developed, the facts of sex impulses are faced, and the effects of sex enlightenment are ably set forth. The psychology of high school government is neatly sketched, and the value of pupil participation well stated.

In Chapter VIII, on moral and religious education, Commissioner Sisson emphasizes the importance of the development of ideals, and advocates a positive training in the biological significance of sex. He believes that the high school should provide a definite training in the functions and duties of parenthood for both boys and girls.

Chapters IX to XVI are devoted to specific high school subjects as English, Latin, and Greek, modern languages, natural sciences,

mathematics, social sciences, fine arts, and household arts. In his discussion of the aims and methods of natural sciences in the high school Professor Twiss keeps to the psychological point of view throughout, and defends a moderate and sane theory of transfer of training in the development of scientific concepts of method. He also urges a careful study of the factors of appeal, and frankly bases his selection of subject matter to a large extent upon the appeal which it makes to the pupils.

The remaining chapters deal with vocational education, hygiene, and physical education, athletics, social aspects of education, and the reorganization of secondary education. In discussing reorganization Commissioner Snedden urges that for the selection of subject matter we should study the needs of contemporary society and analyze these to determine in what way the high school can contribute to their fulfillment; and for methods of teaching we should have much more extensive experimental studies of the means by which responses may be evoked from high school pupils.

The book will take a front rank in the group of scientific discussions of high school problems which we are now so fortunate as to have coming from the press.

J. C. B.

THE JOURNAL OF EDUCATIONAL PSYCHOLOGY

INCLUDING EXPERIMENTAL PEDAGOGY, CHILD PHYSIOLOGY
AND HYGIENE, AND EDUCATIONAL STATISTICS

W. C. BAGLEY,

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EDITORIAL

It is a noteworthy fact that the present is a time of unrest in education. There is not a phase of our whole educational scheme from the kindergarten to the university that is not under the fire of criticism. To some timid and conservative souls this is very disquieting, but for the optimistic and progressive it is a most hopeful sign—an indication that people are becoming dissatisfied with the passive acceptance of tradition, and are disposed to demand a type of education that is in accord with contemporary thinking. At no time in history has the public shown a greater willingness to spend money for education, but it wants to know that it is getting its money's worth. There are charges of waste in college, waste in the high school, and the greatest waste of all in the elementary school. No one feels more keenly than the educators themselves that in some way our present educational procedures are wrong. The recent report of the National Education Association committee on economy of time shows a clear realization of this waste. In many quarters complaint is made that school curricula are overcrowded, that teachers are obliged to attempt too many things, that there is a wild scramble to "cover the ground" and no intensive mastery of anything. A certain vociferous, non-reflecting element raises a great outcry against the "new subjects"

that have been introduced into the schools, holding them up to ridicule as "fads and frills." Their slogan is, "Back to the fundamentals!"

But what are fundamentals in education? An answer to this question can be found, as Commissioner Snedden has pointed out, only in a study of the social needs of our time. Is arithmetic a fundamental? Assuredly not! Even a casual inquiry will show that in all lines of social activity—in the professions, in business, in manufacturing, in banking, in social work, in the drawing room, in the kitchen—the need for arithmetic is vanishingly small. The engineers, the bankers, the insurance men, the bookkeepers resort to tables and machines for even their simplest computations. Is handwriting fundamental? The business man or the business woman scarcely uses the pen for anything more extensive than a signature, almost all literary work is produced on the typewriter, and even in social correspondence it is felt to be something of an infliction to have to decipher script when the mechanical writing is so much clearer, neater, and more legible. Is spelling fundamental? Recent studies have shown that ninety per cent. of all the words that are ordinarily used in writing are found in a list of 1000 words. Of these not over 200 words would give trouble to any one individual, and these could be learned with ease in twenty hours of properly distributed practice. Is grammar fundamental? All experimental studies agree that its contribution to efficiency in the use of language is negligible, and that it might well be relegated to the college or the graduate school. Of all the traditional elementary subjects reading alone retains its place of primary importance, and even it is undergoing striking modifications in method of treatment.

A broader conception is needed of fundamentals in education, and a consideration of the demands made by modern life upon the individual who is to pass as educated leads to the recognition of four lines of study which are basic for all education, and which should be kept in view in making curricula from the elementary school to the college. They are: (1) A study of the vernacular, including the technique of silent reading, a broad knowledge and appreciation of the best in modern literature, and fluency in both oral and written expression. (2) An understanding of and respect for the natural sciences and their significance for the conduct of practical affairs. (3). The social sciences, including history, economics, government, sociology, and individual and social psychology. (4) A comprehension of

art as the loftiest product of human intelligence, a familiarity with representative masterpieces of painting, sculpture, architecture, and music, and the development of a certain degree of skill in one or more of these lines. These are the four cardinal points of a liberal education, and should determine the direction of the teaching process in the elementary school, in the high school, and in the college. A detailed consideration of the changes in courses of study which acceptance of these four fundamentals would involve must be postponed to a subsequent occasion. It remains merely to emphasize the omission of mathematics and languages from the list of fundamentals. Far be it from the writer to underestimate the interest and value of these venerable objects of mental activity. No scheme of secondary or higher education should be devoid of opportunity for those students who wish to perfect themselves in these lines. But from the point of view of general social needs their significance is ancillary rather than fundamental.

J. C. B.

NOTES AND NEWS

Mr. W. F. Doughty, Texas State Superintendent of Schools, plans to establish a bureau of educational research and school surveys in connection with the state department of education. The director of the bureau is to be a specialist in the experimental study of school problems, and the staff is to be at the service of city and county school systems for the study of any question on which accurate information is desired. The bureau will serve as a clearing house for scientific information on educational questions and will strive to unify and direct the efforts for the improvement of educational conditions in Texas. The recent studies of certain phases of the school systems of San Antonio and Dallas have aroused much interest throughout the state in the possibilities of increasing educational efficiency, and there are many calls for unbiased reports on local conditions. If the plans of Superintendent Doughty are carried out, Texas will be one of the first states to formally recognize educational research as a function of the state department of education.

The graduate subject of Education at The Johns Hopkins University, which was formerly associated with Philosophy and Psychology, and more recently with Philosophy, has been made a separate department. The title of the chair occupied by Professor Edward F. Buchner will be changed to that of Education from the former title of Education and Philosophy. The conditions of admission to candidacy with Education as the principal subject for the degree of Master of Arts and Doctor of Philosophy will continue to be the same as in the other departments.

Dr. Jean Weidensall, whose study of the Mentality of criminal women at the Bedford Hills Reformatory will appear soon in the *Educational Psychology Monographs*, plans to work in New York City, after the first of August, establishing norms for some of the more important mental tests as applied to law-abiding women. The groups to be investigated include house maids, clerks, waitresses, laundresses, and chorus girls.

W. V. Bingham, who goes in September to take charge of the Department of Psychology and Teacher Training at the Carnegie Institute of Technology, Pittsburgh, reports that the staff for the coming year is now complete. The position of assistant professor

of psychology has been filled by the appointment of James Burt Miner of the University of Minnesota, who will specialize in statistical studies. Jonathan L. Zerbe and Katharine Murdoch remain as instructors in educational psychology, and will devote attention to the psychology of industrial processes and of the teaching of these processes. Louis L. Thurstone of the University of Chicago and Margaret L. Free of Bryn Mawr College have been appointed assistants in the bureau of mental tests, and will attempt some measurements of vocational aptitude.

Dr. Ellsworth E. Faris has been appointed associate professor of psychology, with special reference to social psychology, in the University of Iowa.—*School and Society*.

Mr. J. C. Brown, head of the department of mathematics in the Horace Mann School, Teachers College, Columbia University, and known to the readers of this JOURNAL for his contributions to the subject of drill in arithmetic, has been appointed principal of the University High School at the University of Illinois.

Professor Charles L. Simmers, assistant professor of education in the State College of Washington, has been made head of the new department of education at the New Hampshire College.

At the University of Texas Dr. L. W. Sackett and Dr. Truman L. Kelly have been promoted to the rank of adjunct professor of the philosophy of education, with which subject the work of educational psychology is incorporated in that institution.

Dr. Karl M. Dallenbach of the University of Oregon has accepted a position in the department of psychology of the Ohio State University.

Dr. E. L. Talbert has been appointed secretary of admission in the University of Cincinnati, also giving courses in social psychology.—*Science*.

Dr. Colin A. Scott of the Boston Normal School has been appointed professor of education at Mount Holyoke College to fill the vacancy caused by the resignation of Professor Kohl.—*School and Society*.

Dr. Paul R. Radosavljevich, assistant professor of experimental pedagogy in the School of Pedagogy of New York University, has been promoted to a full professorship. Dean Thomas M. Balliet will take his sabbatical year next year, and Professor James E. Lough has been appointed lecturing dean during his absence.—*School and Society*.

At Dartmouth College the courses in psychology and education, which have been taught by Professor Bingham, will next year be divided. Dr. H. C. Moore, Ph.D., Harvard, who has been teaching at Simmons College, has been appointed assistant professor of psychology. Professor J. C. McConaughy, Ph.D., Columbia, of Bowdoin College, has been appointed professor of education and executive secretary of the Committee on Admissions. Dr. McConaughy will also assume the directorship of the Summer Session. The departments of Psychology and Education will have ample room in Bartlett Hall, a building which has heretofore been occupied by the Christian Association, and which will provide two large lecture halls, general laboratory, apparatus room, shop, offices, and six small rooms well equipped for the teaching of experimental and applied psychology. Among the new pieces of apparatus being installed is a Seashore tonoscope, made by Charles F. Lorenz of Cleveland, Ohio.

Mr. E. D. Jennings, M.A., Texas, has been appointed professor of education and dean of the college at the Texas Woman's College, Fort Worth.

Mr. Thomas Alexander, Ph.D., Columbia, instructor in elementary education at the George Peabody College for Teachers, has been made assistant professor in that institution.

Dr. Guy Montrose Whipple, associate professor of education at the University of Illinois, has been advanced to the rank of full professor.

Mr. C. Truman Gray, instructor in the art of teaching at the University of Texas, has secured a leave of absence for the current year to engage in research work at the University of Chicago. He will investigate problems of reading under a special grant from the Carnegie Foundation for the Advancement of Teaching. His place at the University of Texas will be taken by Mr. James M. O'Gorman, M.A., Columbia, formerly associate professor of education at Miami University.

Dr. William F. Russell, associate professor of secondary education at the George Peabody College for Teachers, has been promoted to a full professorship.

CURRENT PERIODICALS

PEDAGOGICAL SEMINARY. Vol. XX, No. 3, September, 1913. ARTHUR K. BEIK. *Physiological Age and School Entrance*. 277-321. A review of one hundred and six books and articles on physiological and anatomical age, including a discussion of height and weight, dentition, growth of skull and brain, development of the eye, and mental development. The account of the development of the teeth is particularly detailed and helpful. The author argues that the period at which children usually enter school is one of marked transition in physical development, and that this is of far greater importance than chronological age in determining the qualifications for entrance to school.

ANNA GILLINGHAM. *One Child's Struggle in the Preparation for Life*. 343-359. An intensive study of an eight year old girl, who was slightly in advance of her age by the Binet tests, but who was a failure in school. The chief reason for the failure seemed to be a peculiar confusion of space relations for words and parts of words in reading and writing, and for the order of processes in arithmetic. The cure consisted in the gradual upbuilding of habits of procedure in attacking specific tasks. Self-confidence and eagerness to learn were encouraged by warmly praising every successful attempt and ignoring the unsuccessful ones. The training resulted in marked improvement, although the child is still somewhat defective in school attainments.

WILLIAM H. BURNHAM. *Orderly Association as a Condition of Mental Health*. 360-390. A critical study of recent experimental literature on association, showing the importance of building up definite and well-organized systems of thought connections in the process of education. Particular attention is paid to the phenomena of interference in associations, and to the necessity of reducing this interference to a minimum if good results are to be obtained in the educative process.

No. 4, December, 1913. FRANK K. SECHRIST. *The Psychology of Unconventional Language*. 413-459. The author briefly surveys the chief scientific studies of slang, makes an extended examination of the sources from which it arises, and gives a psychological analysis of the effects of its use on the basis of an experimental study with a group of university students.

CYRUS D. MEAD. *The Age of Walking and Talking in Relation to General Intelligence*. 460-484. A study of the histories of fifty normal and one hundred and forty-four feeble-minded children with reference to the age at which they began to walk and talk. Normal children begin to walk between the ages of 12 and 15 months (median, 13.54 months) and to talk between 14 and 18 months (median, 15.8 months). In feeble-minded children the median age for walking is 21.6 months and for talking 34.44 months.

ALICE C. STRONG. *Three Hundred and Fifty White and Colored Children Measured by the Binet-Simon Measuring Scale of Intelligence: A Comparative Study.* 485-515. The author followed Goddard's method of applying the Binet tests, and examined 225 white children between the ages of 6 and 12 years taken from grades I to VII in the elementary schools. The mental age distribution closely parallels that obtained by Goddard. Examination of 125 colored children showed that they were not so far advanced mentally as the whites. The "at age" group was 15 per cent. smaller, while the backward group was almost three times as large. Whether this disparity is due to racial inferiority or to difference in home environment the author is unable to say.

L. B. HILL, A. E. REJALL, AND E. L. THORNDIKE. *Practice in the Case of Typewriting.* 516-529. Two observers, Hill and Rejall, practiced copying (1) the same word passage, reducing the time and the errors as rapidly as possible, and (2) a page of approximately 300 words of changing material. The following table indicates the amount of improvement resulting from five months of daily practice. Rate is expressed in words per minute, errors in words per hundred, and the total amount of practice in hours.

	Initial						Final					
	100 Words			300 Words			100 Words			300 Words		
	Rate	Errors		Rate	Errors		Practice Rate	Errors		Practice Rate	Errors	
Hill.....	10	13		7.1	19		8.6	35.2	6	36	23.4	3.2
Rejall.....		6.3	8		6.8	11.3		7.2	42.9	8		30.5 25.2 3.6

The rate of improvement was fairly uniform, with a slight convexity of the curve at its beginning, and little evidence of "plateaus." The authors conclude that "forty hours of well-distributed practice will enable an intelligent student to copy on the machine approximately as fast as he can by hand."

Vol. XXI, No. 1, March, 1914. E. A. HAMILTON. *Eugenics.* 28-61. A review of one hundred books and articles grouped under the headings: historical, analogical studies, pathological studies, sociological studies, and positive studies. An interesting and valuable summary.

GEORGE E. JONES. *Tuberculosis among School Children.* 62-94. An abstract of recent literature on the subject, embracing 106 numbers. The author concludes that tuberculosis is preëminently a disease of childhood, that much more extensive data should be gathered on the subject and much greater publicity given to it, that greater care should be exercised in the construction of school buildings, in school medical inspection, and in securing recreation for teachers and pupils, and that open-air schools should be more generally introduced.

WILLIAM BOYD. *The Development of a Child's Vocabulary.* 95-124. Records were made at 17 months, and at the end of the second, third, and fourth years. The method consisted in writing down all the sentences that could be noted during the last fortnight of each

year. The words are then tabulated according to parts of speech and subdivisions. A complete vocabulary computed from these sentences and from other sources showed 1657 words at the end of the third year, and 2598 words at the end of the fourth year.

ARTHUR DERMONT BUSH. *The Vocabulary of a Three-Year-Old Girl*. 125-142. A record was kept by the child's mother and father for six months before the child's third birthday, and this list was amplified by tests made with the help of a small dictionary and by comparison with Whipple's list. The total number of words noted was 1944, as compared with Whipple's 1771. There is a brief reference to the agreements and differences noted in the two lists.

THEODATE L. SMITH. *The Development of Psychological Clinics in the United States*. 143-153. Among the clinics mentioned are those of Witmer, at the University of Pennsylvania; Wylie, at Faribault, Minn.; Goddard, at Vineland, N. J.; Healy, at Chicago; Stevenson Smith, at the University of Washington; Miner and Woodrow, at the University of Minnesota; and Wallin, at the University of Pittsburgh. The author believes that this work is still in its infancy, and advocates the establishment of pedagogical clinics in connection with school systems.

No. 2, June, 1914. ERNEST C. MCDUGLE. *A Contribution to the Pedagogy of Arithmetic*. 161-218. There is a brief historical sketch of arithmetic, a consideration of the psychology of arithmetic, a fairly detailed account of recent experimental studies, with especial attention to those of Rice, Stone, and Courtis, and suggested norms for text-books and teaching. The bibliography contains 141 numbers.

WILLIAM H. BURNHAM. *A Health Examination at School Entrance*. 219-241. A summary of Thiele's study of the biology of school beginners, a discussion of the conditions which determine when a child should enter school, and a detailed consideration of the scope and significance of the examination. Among the reasons given in favor of such an examination are to exclude from the school those children who are physically unable to profit from it; to educate teachers and parents in matters of health; and to facilitate proper grading and adaptation of the work of the school to the capacities of individual pupils.

G. STANLEY HALL. *Some Psychological Aspects of Teaching Modern Languages*. 256-263. Foreign language instruction should begin at about the age of ten. The study of a living should precede that of a dead language. Only one foreign language should be taught at a time. Language lives in the mouth and the best results can be obtained only by developing a certain mouth and ear consciousness. Reinforcement by pictures, objects, and acts is of the greatest value. It is of doubtful psychological value to try to exclude aids from other languages. The "natural method" is unnatural in that it ignores a most elaborate set of linguistic associations already established. All hyper-methodic ways of learning a new language are to be regarded with suspicion.

MARTHA J. FULTON. *An Experiment in Teaching Spelling.* 287-289. One hundred words were taught in ten days, ten each day, to a group of 4B pupils, using the following procedure: Each word was written on the board, its meaning explained, it was used in a sentence by the children, it was written ten times by the children and each letter pronounced aloud, and difficult parts of each word were emphasized by intonation of the voice or by colored chalk. Following this one hundred words of similar difficulty were assigned ten words each day with no further directions than to "study the lesson." The results were strikingly in favor of the systematic drill.

No. 3, September, 1914. GUSTAVE A. FEINGOLD. *Suggestions Toward a Study of Mediocrity.* 336-342. A statistical study of the results of ten tests given to a class of 49 college students in Greek philosophy. The author concludes that the so-called mediocre students are not really mediocre in their mental grasp, but more erratic in their methods of study, and that these students need attention perhaps even more than those at the top or the bottom of the class, since for them everything depends upon the proper stimulus.

C. K. LYONS. *The Doctrine of Formal Discipline.* 343-393. The author sets up Locke as the classical protagonist of formal discipline—a procedure that would not pass without protest from many students of education. There follow a detailed analysis of recent experimental studies on transfer of training, an exposition of Thorndike's principles of learning, an enumeration of the things that transfer, and a discussion of the mechanism of transfer. The author reaches the rather startling conclusion that "all learning from experience, all thinking, all inference is transfer." From this point of view it would seem that those subjects which have the highest thought values also have the highest disciplinary values—a view which is almost diametrically opposed to that held by the defenders of "formal" subjects.

CYRUS D. MEAD. *Height and Weight of Children in Relation to General Intelligence.* 394-406. A comparison of 481 normal school boys and girls with 429 feeble-minded boys and girls shows that the feeble-minded are generally deficient in physical development and the greater the mental defect the greater the physical retardation.

E. C. ROWE. *Five Hundred Forty-Seven White and Two Hundred Sixty-Eight Indian Children Tested by the Binet-Simon Tests.* 454-468. The author presents detailed tables of distribution by ages and grades for the white children, who were tested with both the 1908 and the 1911 forms of the scale, and for the Indian children, who were tested by the 1911 scale alone. There are also tables showing the percentage of correct answers for any particular age, and a table showing the mental distribution and the percentage testing at and above age for each chronological age. The Indians are everywhere inferior to the whites, and the difference between them is much greater than the difference between white and colored children discovered by Strong.

PUBLICATIONS RECEIVED

(Notice in this section does not preclude a more extended review.)

L. R. ALDERMAN. *School Credit for Home Work*. Boston: Houghton Mifflin Company, 1915. Pp. viii, 181. \$1.00.

If motivated study is the only study of real value the closer the union between school and life work the better will both sets of tasks be performed. In many ways the school is reaching out into the home, and now it is proposed to take the home into the school. The little book under discussion shows how this is being done. Part one is composed of a series of chapters to show the value of such an arrangement, while in part two the author presents representative plans for crediting home work. The author has performed a service in assembling this material in a single volume.

LEONARD P. AYRES. *A Measuring Scale for Ability in Spelling*. New York: Russell Sage Foundation, 1915. Pp. 58. Scale 5c, Monograph 30c.

The two striking features of this scale are: first, the selection of the thousand commonest words in the English language, and second, the determination of the difficulty of these words as spelled by children of different grades. From four different sources the author determined the frequency of the commonest words in each 100,000 running words. The thousand commonest words were then arranged in fifty lists of twenty words each and sent to the superintendents of 84 cities. The results present an aggregate of 1,400,000 spellings secured from 70,000 children. On the basis of these data the words were so arranged in 26 columns that all of the words in each column are of approximately equal spelling difficulty, and that the steps in spelling difficulty from each column to the next are approximately equal steps. At the top of the scale there are numbers which indicate what percentage of the words in each column is spelled correctly by the children of each grade from the second to the eighth. It is an extremely interesting effort at scale construction and will undoubtedly have a decided use in testing the results of school work.

GEORGE HERBERT BETTS. *My Chance to Achieve*. Indianapolis: The Bobbs-Merrill Company, 1915. Pp. 78.

A series of interesting talks on some of the fundamental questions that we want our boys and girls to think about. The topics are: the significance of great discoveries; the teachings of experience; the call

of opportunity; the challenge of the present; and the meaning of the self. The book constitutes a challenge to enterprising and ambitious youth to make the most of themselves.

L. R. BLAICH. *Three Industrial Nations*. Cincinnati: American Book Company, 1915. Pp. 366.

The three nations whose industries are described are Germany, England, and the United States. While the present book was planned and constructed before the outbreak of the war, the topics treated make it a most fascinating work for the understanding of the resources of the belligerents and for the opportunities of America in her relations to the other countries of the world. The book is profusely illustrated, contains many splendid maps, and it will be found interesting to both young and old.

WALTER B. CANNON. *Bodily Changes in Pain, Hunger, Fear, and Rage*. New York: D. Appleton and Company, 1915. Pp. xiii, 311. \$2.00.

The author's investigations on the physiology of digestion have secured him an enviable position in the world of science. In this book he has set forth the results of these investigations in consecutive form and in such simple language that the account may be understood by the intelligent layman as well as by the physiological specialist. Such a simple and popular, but accurate and scientific, account of researches into the functions of emotional excitement will be of decided practical value as well as of theoretical interest. The psychology of the emotions has not as yet attained to great heights of development, and this contribution to the subject from the physiological side furnishes data which are basic for the psychologist, the educationist, and the man of practical affairs.

GEORGE W. CRILE. *The Origin and Nature of the Emotions. Miscellaneous Papers*. Philadelphia: W. B. Saunders Company, 1915. Pp. vii, 240. \$3.00.

The author brings together in this volume a number of papers and addresses in which he expounds and advocates his kinetic theory of shock as the phylogenetic origin of the emotions. From extended researches the author is convinced that he has established the pathological identity of surgical and emotional shock. The argument starts with Darwin's pioneer work on the expression of the emotions in man and animals, and is based largely on Sherrington's "The Integrative Action of the Nervous System," and on Cannon's "Studies on the Physiological Effects of the Emotions." The book is intended more for the specialist in psychology, physiology, or medicine than for the general reader.

BENJAMIN DUMVILLE. *The Fundamentals of Psychology*. Baltimore: Warwick & York, Inc., 1915. Pp. lx, 382. \$1.40.

The subtitle of this book is "A Brief Account of the Nature and Development of Mental Processes for the Use of Teachers." The book is intended as a text for use in training schools for teachers. The author believes that there is a distinct value in the study of pure psychology for those who are intending to undertake the work of teaching. The introductory chapter presents a defense of this position and the subsequent chapters deal with the relation between body and mind, the analysis of mental phenomena, sensation, perception, imagination, ideation, memory, conation and feeling, instincts, the sentiments, the will, and attention. Whether the author may be indulged in the desire to call his treatment of the subject "pure psychology" is open to question. The emphasis seems to be laid upon the application of certain psychological principles to educational procedure rather than upon the strict analysis of consciousness. Continental writers on psychology are pretty generally ignored, but there is liberal mention of the results of English and American investigations. The argument is scholarly and sustained, and the book is worth careful reading and study by every teacher.

LU LESTER EVERLEY, RALPH E. BLOUNT, AND CALVIN L. WALTON, *A Brief Laboratory Course in Physical Geography*. Cincinnati: The American Book Company, 1915. Pp. 98.

A laboratory outline in loose-leaf notebook form, containing questions, problem exercises, and experiments that will tend to deepen and vivify the pupils' interest and proficiency in physical geography. A worthy step in the right direction in treating this subject.

M. E. HAGGERTY. *Arithmetic: A Coöperative Study in Educational Measurements*. Indiana University Studies, No. 27. March 1, 1915. Pp. 385-508. 50c.

With the assistance of twenty Indiana city superintendents the author gave the Courtis Standard Tests in Arithmetic, Series B, to 8712 school children. The monograph presents a detailed tabulation of the results and a discussion of the Courtis Tests as instruments of educational research. In spite of certain objections the author cordially endorses the use of the tests and indicates the advantages which will accrue from their use to the pupils in, and the managers of, a school system. It is the most detailed and best organized study of attainments in arithmetic that has yet been made.

REUBEN POST HALLECK AND ELIZABETH GRAEME BARBOUR. *Readings from Literature*. Cincinnati: American Book Company, 1915. Pp. 320.

Selections from English and American prose writers and poets

intended to serve as a basis for practise in oral and written English. They range from Wordsworth to Alfred Noyes, and from Jonathan Swift to O. Henry.

W. H. HECK. *The Health of School Children. Contributions from American Medical Journals, July, 1913-July, 1914.* Bulletin No. 628. Washington: Bureau of Education, 1915. Pp. 160.

The compilation includes articles on the medical inspection of schools, organic diseases of children, care of crippled children, defective eye-sight, treatment of teeth, obstructions of nose and throat, conservation of the hearing, the hygiene of nervous children, the treatment of the feeble-minded, and general school hygiene.

LESTER S. IVINS AND FREDERICK A. MERRILL. *Practical Lessons in Agriculture.* Cincinnati: American Book Company, 1915. Pp. vi, 223.

The materials in these lessons are arranged by months in such a manner that the subjects studied may be as seasonable as possible. The selection from a wide range of possible topics seems to have been determined by a judicious combination of the practical and the scientific. There is a wealth of illustration and diagram.

C. G. JUNG. *The Theory of Psychoanalysis.* Nervous and Mental Disease Monograph Series, Number 19. New York: Nervous and Mental Disease Publishing Company, 1915. Pp. 135. \$1.50.

The lectures comprised in this volume were delivered in the extension course at Fordham University, New York City, in 1912. In them the author sets forth his views of psycho-analysis, and shows how they differ from those of his colleague and master, Sigmund Freud. Among the most interesting chapters of the book are: chapter one, A Consideration of Early Hypotheses; chapters five and seven, The Unconscious and Its Contents; and chapters nine and ten, On the Therapeutical Principles of Psychoanalysis, and General Remarks. One is impressed by the high degree of symbolism and the imagination displayed in the analysis and interpretation of dreams and of the results of psychoanalysis. This, of course, is justifiable if in terms of the pragmatists "it works." With critical scrutiny of results the bizarre and fantastical will gradually be eliminated and the kernel of truth, which is undoubtedly to be found in the theory of psycho-analysis, will be revealed and substantiated.

T. N. KELYNACK. *Defective Children.* New York: William Wood and Company, 1915. Pp. xvi, 462. \$3.00.

The aim of the book is to provide authoritative information regarding the chief classes of defective children that require special medical

supervision and educational care. Each chapter of the volume has been written by a recognized expert who has been allowed a free hand in the expression of his information. There is a group of chapters on types of mental defect, defects of vision and hearing, and special defects. There are chapters on spinal and nervous troubles, on disturbances of the heart, on boys and girls of defective growth in secondary schools, on school clinics and dental clinics, and on open-air schools and schools for cripples. The final group of chapters deals with the means for finding, caring for, and educating defective children in Scotland, Ireland, Canada, United States, France, Germany, and Hungary. As a reference manual on the defective child the work will undoubtedly find a permanent and abiding place.

E. A. KIRKPATRICK. *The Use of Money*. Childhood and Youth Series. Indianapolis: The Bobbs-Merrill Company, 1915. Pp. 226. \$1.00.

In spite of all that may be said in criticism of the American people in their eager pursuit of the dollar, it must be admitted that money is one of the highest symbols of well-being in modern civilization. Money as money amounts to very little, but as representing the results of strenuous endeavor and the possibilities of further influence for good and bad, money is one of the most idealistic topics of modern times. Again and again one hears of young people who fail or go wrong because they have no conception of the proper use of money. Many parents fail to realize their opportunities and fail to take seriously the obligation which rests upon them of training their boys and girls to become efficient citizens. The present book will be of great assistance to parents and teachers in training children in the proper use of money. There are chapters on the natural development of ideas of money, on the training of children in how to spend money, on the subject of allowances, the purchase of their own clothes, private accounts, and the use of financial situations in school arithmetic. The book is written in the author's customary lucid style, and will be a boon to many a puzzled parent.

GEORGE TRUMBULL LADD. *What to Believe? An Inquiry into the Nature, the Grounds, and Value of the Faiths of Science, Morals, and Religion*. New York: Longmans, Green and Company, 1915. Pp. viii, 275. \$1.50.

This is a continuation of Professor Ladd's practical discussions of philosophical problems. The first attempted to answer the inquiry, "What can I know?"; the second, "What ought I to do?" The present book contains the answers of the philosopher to some of the fundamental questions of belief propounded by the intelligent layman. The author clearly points out the fact that the scientist depends

upon belief no less than the follower of religion. The essential difference between them lies in the foundations of their beliefs. A chapter is devoted to a discussion of the famous phrase of James, "The Will to Believe." There is a comparison of lesser and greater beliefs, a consideration of the rights and applications of belief, a comparison of scientific and social beliefs, and an examination of the faiths of morality and religion. The author finds religious belief the highest form of human attitude.

ROBERT A. LYSTER. *School Hygiene*. Baltimore: Warwick and York, Inc., 1915. Pp. viii, 388. \$1.15.

An important step in hygienic reform is the recent legislation which makes medical inspection compulsory in many school systems. The present volume is designed to enable teachers to obtain sufficient training in hygiene that they may be capable assistants to the school medical officer. The divisions of the book are the traditional ones of the school building, the scholar and his physical training, the laws of health and medical supervision, school medicine and surgery. The chapter on the hygiene of the eye gives a fairly extended account of the anatomy of that organ, methods of testing vision, and some of the results obtained from such tests. As a brief outline survey of the whole field the author's task has been performed with credit. The book will be found very useful for those who have no access to the larger and more detailed discussions.

ALBERT A. MÉRAS AND B. MÉRAS. *Le Premier Livre*. Cincinnati: The American Book Company, 1915. Pp. 200.

This is an elementary French book which is constructed on the basis of Hector Malot's "Sans Famille." The lessons include a study of words, reading, conversation, grammar, and composition. The illustrations are genuinely French, and will serve to make the work more attractive to beginning pupils.

F. W. MOTT. *Nature and Nurture in Mental Development*. New York: Paul B. Hoeber, 1915. Pp. xii, 151. \$1.50.

This is a popular exposition of the principles of heredity as shown in mental activity. In the discussion of mental deficiency the author contends that 75 per cent. of mental defect is due to heredity and only 25 per cent. to pre-natal and post-natal conditions. While stressing the tremendous influence of heredity in mental development, he points out that it is not yet proven that mental characters conform to Mendel's Law, as the conditions are too complex to admit of factorial analysis. There is a brief consideration of genius in relation to heredity, the inheritance of individual characters, temperamental inheritance, the influences of nutrition and education in mental development, the function of sleep, the effect of the emotions on mental growth,

the control of the emotions, and the establishment of good habits. Interesting lessons are drawn from the education of Laura Bridgeman, Helen Keller, and others suffering from sense defects, and there is a cursory reference to the order of development of the physiological functions of the brain. The author's message contains nothing new for the specialist, but some of the fundamental facts of heredity are clearly and concisely put.

J. HERBERT PARSONS. *An Introduction to the Study of Color Vision*. New York: G. P. Putnam's Sons, 1915. Pp. viii, 308. \$3.75.

This book will be a boon to advanced students of psychology, for it brings together in compact form the most recent investigations upon the subject. Part one deals with the chief facts of normal color vision, outlining the physical, anatomical, and psychological basis of color, discussing the color vision of the light and the dark adapted eyes, the sensitivity of different regions of the retina to color stimuli, and the evolution of color vision. Part two presents the chief facts of color blindness, and part three outlines the most important theories of color vision. The book will be an indispensable adjunct to the psychologist's library.

JAMES JACKSON PUTNAM. *Human Motives*. Boston: Little, Brown and Company, 1915. Pp. xvii, 179. \$1.00.

A study in the psychology and philosophy of human conduct based largely on the author's use of the Freudian psychoanalytic method of mental diagnosis. The author finds the two main sources of motive in the desires and instincts which have come to us from our evolutionary history, and the aspirations which arise from our social relationships. The first chapter describes the sources of motives and indicates the significance of the psychoanalytic as contrasted with the philosophic method of study. Chapter two discusses the rational basis of religion, developing the relation of the individual to the creative energy which underlies the universe. Chapter three deals with the history of the psychoanalytic movement, and chapter four with its educational bearings. Chapter five discusses further the clash between instincts and ideals, and chapter six develops an attempt at synthesizing the various elements entering into conduct. The book presents the reflections of one of the most scholarly neurologists in the country upon the problems of general conduct and education. It deserves and will undoubtedly have a wide reading.

Report of a Survey of the School System of Butte, Montana. Butte: Board of School Trustees, 1914. Pp. ix, 163.

The Butte Survey Commission consisted of Prof. G. D. Strayer of Columbia; Frank P. Bachman, New York City; Ellwood P. Cubberley, Stanford University; William T. Bawden, U. S. Bureau of

Education; and F. J. Kelley, State Normal School, Emporia Kansas. The report is in two parts. Part one deals with the instructional problem, discusses the classification and progress of pupils, the equality of instruction, the courses of study, the achievements of pupils, the supervision of instruction, and the adaptation of schools to community needs. The achievements of pupils were measured by using the Ayres Spelling Test, the Hillegas Scale for English Composition, the Thorndike Scale for Hand-writing, the Courtis Standard Tests in Arithmetic, Series B, and the Stone Reasoning Problems. The results of these measurements are presented in both tabular and graphic form, and constitute a significant contribution to the literature of school measurements. Part two deals with the administrative problem, and discusses the general administration of the school room, the selection, training, and salaries of teachers, school buildings and equipment, school records and reports, and the financial conditions of the school system.

Report of Fifty-two Borderline Cases in the Rome State Custodial Asylum. Eugenics and Social Welfare Bulletin, No. 4. Albany, N. Y.: Bureau of Analysis and Investigation of the New York State Board of Charities, 1914. Pp. 99.

The investigation of these 52 children consisted of two distinct parts—the study of the family history, and the study of the individual child. The family history was secured by personal visits, if possible, by the study of the records on file, by securing information from agencies dealing with the case, and by interviews with the commitment officers. The study of the children consisted of a mental examination by means of the Binet-Simon Measuring Scale of Intelligence, and a comparison of the results with previous tests made within the last year or two years by the same scale. This procedure gave an opportunity to measure the mental changes in the interim. Such reports are valuable not only in dealing with the individuals involved, but in establishing a body of carefully gathered material which will increase our knowledge of the status of the feeble-minded and will enlighten us as to the best method of procedure in dealing with these unfortunates.

Report of the Work of the Bureau of Education for the Natives of Alaska, 1912-13. Bulletin, Number 605. Washington: Bureau of Education, 1914. Pp. 62. 25c.

This monograph contains a general report of Alaskan education, a discussion of the reindeer service, the special reports of superintendents and teachers, and reports of health conditions in Alaska. There are many illustrations of work among the Eskimos, and there is an excellent map of Alaska showing the location of the educational stations.

Roberts's Rules of Order, Revised. Chicago: Scott, Foresman and Company, 1915. Pp. 323.

A revision and enlargement of the standard manual on rules of order to meet the increasing complications of parliamentary gatherings. The new book contains nearly twice as much material as the last previous edition, and on parliamentary points is strictly up-to-date.

ISAAC SHARPLESS. *The American College.* New York: Doubleday, Page and Company, 1915 Pp. xi, 221. 60c.

The author, who was for thirty years president of Haverford College, is excellently equipped for the task which he has undertaken. He presents first a brief history of the American college, then discusses college administration, the courses of study in college, student life, and the function of the college in relation to the secondary school, the university and the public.

GUY MONTROSE WHIPPLE. *Manual of Mental and Physical Tests.* Second Edition, Revised and Enlarged. *Part II: Complex Processes.* Baltimore: Warwick & York, Inc., 1915. Pp. v, 336. \$2.00.

The second volume of the *Manual*, which has been impatiently awaited by educational psychologists for a long time, gives evidence of extensive and thorough-going revision. Two new tests have been added, and the discussion of the old ones has been completely rewritten and materially expanded to take account of the progress in experimental investigations since 1910. The subject matter of the second volume is of more vital interest to the educationist than that of the first, in that the tests considered have to do with description and report, association, learning, memory, suggestibility, imagination, invention, and range of vocabulary. The two new tests introduced are the Kent-Rosanoff uncontrolled association test, and the analogies test, brought into prominence by the work of Burt and Woodworth and Wells. Of especial significance are the tests for fidelity of report, after Stern, in which reference is made to recent work by Dallenbach, Boring, Schultz, Lipmann, and Franken; the substitution test, based almost altogether upon work done since 1910; memory for ideas, involving recent investigations by Pyle, Vos, Simpson, Aall, Heymans, Michotte, and Winch; linguistic invention, with a consideration of the work of Burt, Wyatt, Meumann, Weidensall, and Woolley and Fischer; the Ebbinghaus completion test, with new results by Fraser, Heymans, Simpson, and Terman and Childs; and the interpretation of fables, based especially upon the work of Terman and Childs. It will be a matter of regret to many that, owing to the tremendous increase in critical and experimental material, the author was obliged to omit the chapter on the Binet tests. In lieu of this he promises

a supplementary volume which will deal in a comprehensive manner with the Binet and other systems of tests.

Whittier State School. Biennial Report of the Board of Trustees and Superintendent. Whittier, California; Department of Printing Instruction, 1914.

A significant feature of this report of the California state reform school is the psychological survey of the school by Mr. J. Harold Williams and Professor Lewis M. Terman of Stanford University. The examination of the boys with the Terman form of the Binet Scale showed that approximately 28 per cent. were definitely feeble-minded, 25 per cent. were border-line cases, 22 per cent. belonged to the "dull normal" group, and only 25 per cent. gave evidence of average or superior intelligence. There are numerous graphs showing the racial distribution of the pupils, and the status of each racial group by chronological and mental ages.

RICHARD H. WILLIAMS AND WALTER G. WHITMAN. *Laboratory Exercises in General Chemistry.* Cincinnati: The American Book Company, 1915. Pp. 161.

The plan of this laboratory manual is to combine the printed directions for the experiments and the written reports of the experiments in a single volume. The volume is constructed on the loose-leaf principle, so that leaves for further directions or discussion may be inserted at pleasure. The authors believe that their plan will make for clearness of direction, compactness of report, and ease in controlling the work of the class by the instructor.

JOHN DUTTON WRIGHT. *What the Mother of a Deaf Child Ought to Know.* New York: Frederick A. Stokes Company, 1915. Pp. xix, 107. 75c.

The author's chief plea to the mother of the deaf child is "Do not delay his education." Since the deaf child necessarily has more difficulty in learning than the hearing child, he should begin earlier and be kept more persistently at it. The principal form of early training consists in talking to the child just as if he could hear. By securing the child's attention to the movement of the lips he can soon be taught to understand the substance of much that is said, and the foundation will be laid for the detailed study of lip-reading which will come later. On the negative side, the author begs the mother not to try to teach the child to talk. This is too difficult for any one but the trained expert and the inexpert teacher may do much damage. Furthermore, the mother is urged to send her child to a school for the deaf at the earliest possible date, secure in the consciousness that such associations will in every way be better for the child, and will prepare him the most effectively for his later work in life.

ROBERT M. YERKES, JAMES W. BRIDGES, AND ROSE S. HARDWICK.
A Point Scale for Measuring Mental Ability. Baltimore: War-
wick & York, Inc., 1915. Pp. viii, 218. \$1.25.

The authors are convinced that the Binet mental age scale has served its purpose and must give way to a superior and more flexible method of mental measurement. The present volume represents an effort to develop a scale which will take account of differences in the responses to each test, and which will depend for its evaluation upon norms derived from actual measurements. Part I gives a general description of the Point Scale, the mental functions tested, and the distribution of credits among these functions. The tests are chosen chiefly from the Binet material, as this has been extensively used and each test has a large amount of critical and statistical data for comparison. Part II presents the results of the application of the scale to 850 normal individuals, chiefly elementary school pupils ranging from four to fifteen years. There are elaborate tables and graphs of the findings, norms for age, sex, linguistic, and social status, a discussion of the limits of applicability of the scale, and a study of the reliability of the results on the basis of 100 individuals measured by both the Point Scale and the Binet Scale. Part III describes the application of the Point Scale to 155 defective or deranged individuals, and Part IV makes an analysis of the results thus far obtained as a basis for a revision of the Point Scale, presents the revised scale with detailed directions for its application, and derives the principles of a universally applicable measuring scale for mental ability. The book will prove a valuable and fruitful contribution to the literature of mental testing.

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THE INFLUENCE OF IMPROVEMENT IN ONE SIMPLE MENTAL PROCESS UPON OTHER RELATED PROCESSES.

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The problem to be solved in the transfer of training is no longer whether improvement in one function will be equally effective for all functions, nor whether improvement in one function is absolutely restricted to that function. It is, rather, to what extent training in one particular function will be effective for another particular function. The formulation of the laws of transfer can result only from amassing a large amount of concrete material, determined from a large number of individuals. To quote from Thorndike,¹ the experimental facts now at hand "are in a sense trivial in comparison with the very great variety of facts which must be measured in order to describe justly the spread of improvement in the work of the schools, trades, and the like."

A historical review of the investigations in transfer would be superfluous in this paper, since several authors have so recently covered the ground. The latest and the most noteworthy is Thorndike's² discussion of the influence of improvement and the extensive bibliography accompanying it.

¹ *Educational Psychology*, Vol. 11, p. 417, 1913.

² Loc. cit.

The present experiment, although intended mainly to add to the general fund of transfer studies, differs in several particulars from previous work. First, the training series was continued long enough to bring the curves of improvement practically to a level, before the transfer effect was tested. In the work of Ebert and Meumann, for instance, some of the training series occupied scarcely more time than the test series, that is, there was about as much chance for improvement directly in the test series as there was in the training series. Add to this the fact that they used no control subjects and the conclusions are not especially convincing.³ This defect in transfer studies parallels that of discussing the effects of practice upon a group of individuals from curves which have simply passed beyond the point of most rapid fall. Hollingworth⁴ has shown that the relations among a number of individuals at the end of practice is quite different from their relations after the point of rapid decline in the curve has been passed. Second, the possibility of transfer of the very general factors such as adaptation to the conditions of the experiment, acquaintance with the material, distribution of attention, etc., were eliminated as far as possible. In most of the transfer experiments, these factors make up the bulk of the transferred improvement, just as they cause the rapid fall in a short practice curve. These general factors were eliminated by selecting subjects who were familiar with psychological tests and who in most cases had had experience with the very tests used. In addition to this familiarity with the experiment, a more specific acquaintance with the material was obtained by considering the first two trials in the first and the last test series in the case of both the trained and the control groups as preliminary and not to be calculated in the results. If one is to be able to refer transfer of improvement to specific elements in the process or to the formation of definite bonds between situation and response, these general sources of improvement should be removed. However, one difficulty may seem to arise with this procedure, and that is that the amount of preliminary acquaintance with the tests will be unknown and will most likely differ among the subjects. But this difficulty is present to a certain extent in every

³ For a discussion of the methods of Ebert and Meumann, see Thorndike, loc. cit.

⁴ H. L. HOLLINGWORTH. *Correlation of Abilities as Affected by Practice*, J. OF ED. PSYCH., September, 1913.

practice curve because no individual starts at his zero point of efficiency in any of the functions that we can test. So in this, as in all other work of the kind, we do not attempt to remove this particular difficulty but to make allowance for it in our calculations. The indefinite starting point is especially troublesome in computing per cents. and averages. As there are so few subjects in the experiment, the tables that follow give results expressing improvement in absolute amounts together with the amounts of the initial performance in each test.

The general plan of the experiment was as follows: Eight subjects, and in some of the tests eleven, repeated each of a series of seven tests five times. Four of these subjects were then selected as a training group while the others became the control group. The training group was practised in each of another set of four tests for 100 times. This training continued for a period of nine days with approximately eleven tests each day. On the tenth day, the combined group of trained and control subjects was again tested in the seven tests used at the beginning of the experiment. Five trials were given as at the start. Hence, we may compare the performance of a group who had nine days of special training with a group which had no special training during this interval.

The tests taken by all of the subjects and which will be called the "test series" consisted of the Form Naming test, the Adjective-Noun test, the Number Group Checking test (in two parts), and the calculation tests, including Subtraction, Multiplication, and Division. The tests taken only by the training group and to be known as the "training series" consisted of the Color Naming test, the Opposites test, the Number Checking test, and the Addition test. These tests and the procedure will be described in detail later. All errors were announced by the experimenter and corrected immediately by the subject, except in the case of the Number Group Checking test. Here the errors were turned into time amounts by an arbitrary rule and these amounts added to the time for the test. All results are expressed in terms of the time required to do the whole test.

Table I gives the results of the "training series" for the four subjects, A, B, C, and D. The 100 trials are divided into twenty groups of five tests each. The figures given are the averages of these groups of five trials each, and are arranged in the horizontal

rows under the numbers from 1 to 20. An examination of these figures indicates that the Color Naming test shows the least gain. All of the subjects were familiar with this test, but it is one in which very little gain is possible even in the case of new subjects. For that reason it is a valuable test to use where one wishes to avoid complications due to practice effect. In this test, one subject lost 4.8 seconds as a result of the practice work. The average of the first five tests shows the fastest record of the whole series. Subjects who show this result seem to become confused after naming the colors several times and a kind of inhibition results. Introspection suggests quite strongly that this inhibition is not that of the processes by which the thought of the color is aroused but rather that of the speaking mechanism. In the case of all of the other tests, there was a gain, although in one or two instances it was quite small. In the Opposites test subject A has a high initial time and a very large gain compared with the other subjects. This subject was not as familiar as the other subjects with the particular form of the Opposites test, and his gain in the first few tests was rather rapid.

TABLE I.

Results of the Training Series.

(The 100 separate trials are divided into groups of five each. Each figure in the table represents the average of five trials. These averages are arranged in horizontal rows under the numbers 1 to 20.)

<i>Color Naming.</i>										
Subject	1	2	3	4	5	6	7	8	9	10
A.....	43.6	45.0	42.6	42.0	42.0	45.2	41.4	40.4	41.2	40.4
B.....	38.4	42.2	36.6	43.4	40.6	43.6	37.4	37.4	41.2	39.2
C.....	45.8	51.0	45.8	49.8	44.0	48.6	48.0	54.2	50.2	46.4
D.....	31.4	34.0	36.0	34.6	34.0	38.0	38.0	39.4	35.0	37.4
<i>Opposites.</i>										
A.....	90.4	74.2	50.0	48.6	45.2	45.2	40.2	42.0	38.0	40.0
B.....	31.6	31.2	33.8	31.2	35.4	31.2	37.8	32.2	31.0	32.8
C.....	24.6	25.2	24.4	25.0	23.2	24.6	25.4	23.8	28.4	23.8
D.....	29.6	27.6	26.8	24.6	25.0	24.6	23.2	25.0	24.6	25.0
<i>Cancellation.</i>										
A.....	68.0	66.0	58.6	50.2	49.8	49.8	43.8	45.4	45.4	45.4
B.....	60.4	54.6	54.6	51.0	49.0	53.0	50.0	49.4	47.0	48.4
C.....	60.0	60.0	56.4	54.0	55.0	50.4	56.2	59.6	50.6	51.0
D.....	75.0	77.4	72.8	59.6	59.8	60.8	56.2	57.2	57.6	53.0
<i>Addition.</i>										
A.....	109.2	108.0	89.0	83.6	84.6	73.4	66.2	63.2	69.8	59.8
B.....	95.2	83.4	77.4	76.6	69.6	78.8	79.4	66.0	61.0	61.8
C.....	110.0	86.6	84.0	85.4	81.8	78.6	72.2	60.2	63.0	59.0
D.....	242.0	196.4	110.0	91.8	81.6	70.6	67.6	63.2	66.0	63.4

TABLE I (Continued).

*Results of the Training Series.**Color Naming.*

Subject	11	12	13	14	15	16	17	18	19	20
A.....	38.2	39.8	40.0	42.8	39.6	39.0	39.2	40.4	40.8	38.6
B.....	37.2	34.0	36.0	34.8	37.0	38.0	35.8	37.6	36.2	37.4
C.....	52.4	44.6	44.0	44.0	45.0	47.0	39.4	44.8	50.0	43.4
D.....	34.8	36.0	34.4	38.6	35.8	35.6	34.0	36.4	35.8	36.2

Opposites.

A.....	34.8	35.8	34.0	35.2	36.4	36.6	34.2	34.8	34.0	32.6
B.....	28.4	30.4	29.2	30.4	28.4	28.2	25.4	30.6	29.0	28.5
C.....	25.4	23.0	25.2	24.4	22.6	24.0	22.4	21.2	22.0	20.6
D.....	23.4	24.0	23.2	23.8	23.8	24.0	23.8	22.8	20.2	23.1

Cancellation.

A.....	41.4	40.6	42.4	42.4	42.6	41.0	40.0	40.8	40.2	38.0
B.....	49.8	44.0	43.0	44.8	44.0	43.4	45.8	42.2	42.0	39.4
C.....	49.8	43.8	46.0	50.4	40.4	46.8	49.6	45.0	47.0	44.1
D.....	51.8	56.0	53.6	51.2	50.6	57.6	54.2	54.0	51.6	52.5

Addition.

A.....	61.6	59.6	59.6	57.6	57.6	58.8	54.2	54.2	59.2	56.8
B.....	61.0	53.4	54.8	50.2	57.0	51.8	54.8	57.2	49.8	60.0
C.....	59.0	55.0	54.0	52.6	52.0	50.2	52.0	50.4	51.2	48.6
D.....	59.6	53.2	58.8	52.4	52.0	52.2	50.6	49.2	54.2	51.2

I. INFLUENCE OF TRAINING IN THE COLOR NAMING TEST UPON ABILITY IN THE FORM NAMING TEST.

The first problem is the influence of the training in the Color Naming test upon the ability in the Form Naming test. The value of first eliminating from possibility of transfer all of the general bonds between the situations and responses becomes apparent when we take up the above problem. If we had not done so, the cross transfer among the different tests of the "test group" and the "training group" would leave us hopelessly confused. As the results will show later, the bonds between situation and response in this experiment are too specific to cause confusion by transfer among the tests not directly compared.

The Color Naming test consists in naming as rapidly as possible the five most familiar colors, red, blue, yellow, green, and black, each repeated twenty times. These colors are presented on a sheet, in the form of a square with ten colors on a side. At each trial the sheet is turned 90 degrees so that the same order is given every fourth time. The Form Naming test has an identical arrangement, the only difference being that five familiar forms, the star, square, circle, cross, and triangle, take the place

of the five colors. The procedure in both tests is the same. The difference is, then, one of content while the form remains the same. Two types of specific bonds or connections are possible here. First, the formation of connections between the particular arrangement of the objects to be named and the proper method of response. Under this head would be included: the largest number of objects that could be seen at one fixation of the eyes, how far one could safely look ahead, how fast one can speak the words without getting confused, and various other tricks which a subject may acquire. These connections appear to be the same in both cases. It is possible, however, that in case of the most economical speed, for example, there might be a difference between the two tests, so that one finally learns that he must speak the colors more slowly than the forms. Second, the formation of connections between the object seen and the name spoken—this is a direct bond, and differs in the two cases. Forming a bond between red and its name thought or spoken has no influence upon the strength of the bond between star and its name thought or spoken. It is easier perhaps to conceive that the one connection should inhibit the other, the response red by continual repetition might become so habitual that the wrong stimulus, a circle for instance, might tend to produce it. But theoretically one would expect no interference between the two kinds of specific bonds.

Table II gives the results of these tests. The table is divided into two main sections. The first represents the training series (Color Naming), the second represents the test series (Form Naming). The second section is divided into two further sections representing the test series for the trained group and that for the untrained or control group. In each of these divisions will be found the amount of the initial performance and the gross gain. In all cases the initial performance is the average of the last three of the five tests in the first series. The final performance from which the gross gain is calculated is the average of the last three of the five tests in the final series. In the training series, the initial ability is the average of the first five tests and the final ability from which the gross gain is calculated is the average of the last five tests in the training series (See Table I). The gross gain in every case is simply the difference in seconds between the initial and final performance. On account of the

small number of subjects and certain differences in initial time it seems best not to attempt to express the results in per cent. or by more elaborate methods. Although averages are given, references will be made constantly to the individual records. These averages will be found at the bottom of the table, and the reliability of the average is given in terms of its probable error.

TABLE II.

Influence of Training in Color Naming Test Upon Ability in Form Naming Test.

Training Series			Test Series			
Subject			Trained Group		Control Group	
			Subject			
	Init. Perf.	Gr. Gain	Init. Perf.	Gr. Gain	Init. Perf.	Gr. Gain
A.....	43.6	5.0	62.2	3.7	E 68.5	5.0
B.....	38.4	1.0	60.5	-13.2	F 78.6	10.1
C.....	45.8	2.4	51.4	- 6.3	G 57.2	10.1
D.....	31.4	-4.8	58.4	7.1	H 75.8	1.1
					I 68.9	3.8
Av.....			58.1	- 2.2	69.8	6.0
P. E.....				3.2		1.2

A glance at the averages of the test series for the trained group and the control group suggests that the practice caused interference rather than transfer of improvement. The probable error of the averages concerned, however, shows that the difference in time between the two is unreliable. If one considers the separate subjects, it will be seen that for B and C the practice apparently caused interference. For subjects A and D there was a gain of 3.7 and 7.1 seconds respectively. But when this gain is compared with the average gain of the control group, which is 6.0 seconds, this would appear to be no gain attributable to the training series. In considering the lack of transfer, one must note the small gain in the training series. Subject D, who lost in the training series, is the one who gained most in the test series (7.1 seconds). Such phenomena have been reported many times in transfer work. But in this case the matter is simple enough. The gain made by this subject is only one second more than the average gain of the control group, which is 6.0 seconds. Keeping in mind the P. E. of this average, which is 1.2, the gain of 7.1 seconds is what might be expected from one who had had no training whatever.

This experiment, then, shows only very slight gain in the training series, no reliable transfer or interference in the case of two subjects, and interference in the case of the other two. The slight amount of improvement as a result of the long course of training obviously makes the test a poor one for studies in transfer.

II. THE INFLUENCE OF TRAINING IN THE OPPOSITES TEST UPON ABILITY IN THE ADJECTIVE-*NOUN* TEST.

The opposites test which forms the training series consisted of 50 moderately difficult opposites given in the Woodworth and Wells monograph on Association.⁵ The Adjective-*Noun* test used in the test series consisted of the same set of stimulus words to which appropriate nouns were to be attached. If the process involved here be analyzed, we find the objective situation to be identical in the test series and training series, but the response is different, an appropriate noun instead of an opposite being required. A bond formed in the training series between a word and its opposite must be broken and a new bond formed between the given stimulus word and an appropriate noun. Thorndike, in analyzing such connections as this, says, "In the case of alternate systems of bonds, there is, then, often an inhibition for a time, reducing to zero as the two systems of bonds get organized into connection with two systems of mental sets or attitudes, and perhaps giving way to facilitation by reason of certain serviceable identities in the bonds."⁶ In the present experiment there is no opportunity for such alternate bonds to be established by long training, and the question is: Will the formation or strengthening of a certain bond facilitate the formation of a possible alternate bond?

The results of this test are given in Table III. The arrangement of this table is identical with that of Table II. The initial performance in the training series and the gross gains are obtained from Table I. The average gross gain in the test series for the trained and control group show an interference as a result of training. Two of the subjects, A and B, have a poorer record in the final test than in the first test series, as indicated by the minus signs. But the other two subjects, C and D, who show a

⁵ Psych. Rev. Mon. Vol. XIII, No. 5, 1911.

⁶ Loc. cit., p. 356.

gain of 5.5 and 1.0 seconds respectively, have gained less than the control subject who gained the least (Subject F with a gain of 7.2 seconds). The probable error of the averages here is small enough to make the difference between the trained and control group significant. Subject A, who made the greatest gain in the training series, also showed the greatest interference in the test series. These results suggest that, when the possibility of transfer is limited to specific elements, the formation of bonds between a given stimulus and a certain response interferes with the formation of a bond between the same situation and a new response.

TABLE III.

The Influence of Training in the Opposites Test Upon Ability in the Adjective-Noun Test.

TRAINING SERIES			TEST SERIES			
Subject			Trained Group		Control Group	
			Subject			
	Init. Perf.	Gr. Gain	Init. Perf.	Gr. Gain	Init. Perf.	Gr. Gain
A.....	90.4	57.8	77.2	-7.7	E 75.3	15.0
B.....	31.6	3.1	53.5	-6.8	F 60.3	7.2
C.....	24.6	4.0	67.4	5.5	G 57.2	11.3
D.....	29.6	6.5	107.9	1.0	H 119.8	37.1
					K 52.2	7.6
Av.....			76.5	-2.0	73.0	15.6
P. E.				2.2		3.2

III. THE INFLUENCE OF TRAINING IN THE CANCELLATION OF 3 AND 5 SEPARATELY UPON CANCELLATION OF GROUPS CONTAINING BOTH 3 AND 5.

The material for these cancellation tests consisted of the number checking blank described by Woodworth and Wells for the training series, and the number group checking blank, described by the same authors, for the test series. Only one-half of the number checking blank was used at a time. The time for completing each blank was taken, no error being permitted. As in the previous cases, the test series consisted of five tests before and five after the training interval, while the training consisted of 100 repetitions of the given test. In this case, the training consisted of the cancellation of 3's in 50 blanks and of 5's in 50

blanks, the first blank being for 3 and the second for 5 and so on. The procedure in the number group checking test consisted in canceling every group which contained the two numbers 3 and 5. Errors in this test were not immediately corrected. A penalty was arbitrarily assigned for each error. The average time for each figure canceled was determined for each blank and this multiplied by the number of errors. This amount was added to the total time for that blank. This correction for errors made no appreciable difference in the results.

In this experiment, the training series consists in forming two bonds between separate situations and responses, one in the cancellation of 3's and the other in the cancellation of 5's. The test series when analyzed shows these two stimuli to be present, the response now being to a total situation containing these two stimuli. This bond seems to resemble quite closely that described by Thorndike⁷ as "Entire similar change by composition of totals," in which he employs the following example: "The bonds ABC-1, 2, 3, and XYZ-48, 49, 50, being strengthened, the bond ABCXYZ-1, 2, 3, 48, 49, 50 is strengthened."

The results of this experiment are shown in Table IV. This table is constructed exactly as Table II. The average gain in the training series is 22.4 seconds. The average gain in the control group in canceling the number groups containing 3 and 5 is 11.5 seconds, with a high P. E. of 4.0. The average gain in the trained group in canceling like number groups is 23.7 seconds. This difference of 12.2 seconds in favor of the trained group may be attributed to the transfer of the effect of the training. The reliability of this difference expressed in terms of the P. E. of the difference is about 5.0. That is, the difference is about 2.5 times the size of its probable error. The chances of this difference being real are then about 900 in 1000. Expressed in terms of per cent. of the initial performance, the average gain due to transfer would be about 8 per cent.

This test seems to indicate that learning is facilitated by incorporating into the process to be learned previously formed bonds between situation and response, or, in other words, it indicates the transfer of identical elements.

⁷ Loc. cit., p. 351.

TABLE IV.

Influence of Training in Cancellation of 3 and 5 Upon Cancellation of Groups Containing 3 and 5.

Subject	TRAINING SERIES		TEST SERIES			
			Trained Group		Control Group	
			Subject			
	Init. Perf.	Gr. Gain	Init. Perf.	Gr. Gain	Init. Perf.	Gr. Gain
A.....	68.0	30.0	144.4	16.3	E 166.1	4.9
B.....	60.4	21.0	125.0	16.0	F 159.5	17.0
C.....	60.0	15.9	171.4	26.0	G 150.6	24.8
D.....	75.0	22.5	163.1	36.5	J 139.5	-0.9
Av.....			151.0	23.7	153.9	11.5
P. E.....				3.2		4.0

IV. THE INFLUENCE OF TRAINING IN THE CANCELLATION OF 3 AND 5 SEPARATELY UPON CANCELLATION OF GROUPS CONTAINING 4 AND 7.

In these tests the material and procedure are the same as described in the preceding section. The test series consisted in the cancellation of groups containing 4 and 7, instead of those containing 3 and 5. In this case there is no combination of ready formed specific bonds into the new situation-response as there was in the preceding case. There are here no identical elements concerned in the two processes except the more general adaptations which we have tried to eliminate. Although there are no identical elements in the two situations, there is still no necessity of breaking, in the test series, any specific bond formed in the training series, as was the case in Experiment II, the Opposite and Adjective-Noun test.

The results of this experiment are shown in Table V. If the average gains in the trained and control group are compared, the two will be found to agree, 15.0 and 15.9 respectively. The probable errors of these averages show that they are fairly reliable. Here one finds neither an interference nor a facilitation as a result of the training, while the analysis showed neither transfer nor breaking of specific bonds.

TABLE V.

Influence of Training in Cancellation of 3 and 5 Upon Cancellation of Groups Containing 4 and 7.

Subject	TRAINING SERIES		TEST SERIES			
			Trained Group		Control Group	
			Subject			
	Init. Perf.	Gr. Gain	Init. Perf.	Gr. Gain	Init. Perf.	Gr. Gain
A.....	68.0	30.0	130.6	10.4	E 134.3	14.5
B.....	60.4	21.0	118.8	15.8	F 143.3	16.3
C.....	60.0	15.9	162.7	11.8	G 124.1	24.0
D.....	75.0	22.5	159.1	22.0	J 124.7	8.9
Av.....			142.8	15.0	131.6	15.9
P. E.....				1.6		1.8

V. THE INFLUENCE OF TRAINING IN SIMPLE ADDITION UPON ABILITY IN SUBTRACTION.

The material for this test consisted of a series of 50 two-place numbers ranging between 20 and 80 and excluding all numbers containing a zero. The task was to add 17 to each of these numbers as rapidly as possible. The same 50 numbers were used during the whole training process, but were presented in 10 different arrangements. The subtraction test consisted in subtracting 17 from each of a list of 25 numbers as rapidly as possible. This list was obtained directly from the addition list by adding 17 to each. All errors were announced by the experimenter and corrected by the subject. The results are given in terms of time, as in the other tests.

In this experiment there are no identical bonds in the two cases. There is no identity either in the situations or in the responses. It must be said here that in the long training the responses in the addition test never became a matter of such simple association as one finds in the ordinary association tests. Except in the case of a very few numbers, the addition process was actually carried out, although various short cuts were devised.

The results are given in Table VI. The gross gain in the trained group was 8.8 seconds, and in the control group 15.1 seconds. The large gain of the control group is seen to be due to subjects F, I, and O, whose initial performance was high. The difference between the two groups, 6.3 seconds, with the high probable error

TABLE VI.

Influence of Training in Addition Upon Ability in Subtraction.

Subject	TRAINING SERIES		TEST SERIES			
			Trained Group		Control Group	
			Subject			
	Init. Perf.	Gr. Gain	Init. Perf.	Gr. Gain	Init. Perf.	Gr. Gain
A.....	109.2	52.4	59.7	7.0	F 107.7	20.3
B.....	95.2	35.2	67.9	14.9	I 147.3	49.1
C.....	110.0	61.4	64.5	4.3	J 70.7	4.8
D.....	242.0	191.2	143.8	8.9	K 91.8	0.0
					L 46.2	-1.9
					N 101.6	5.6
					O 122.9	27.5
Av.....			84.0	8.8	98.3	15.1
P. E.....				0.7		4.8

attached to the control average, is of little significance and cannot be considered as evidence of interference.

Here again there is an absence of identical bonds in the training and control tests and an absence of transfer or interference as a result of the training.

IV. THE INFLUENCE OF TRAINING IN ADDITION UPON ABILITY IN MULTIPLICATION.

The training series in this test is the same as that in the preceding experiment, i. e., the Addition-Subtraction test. The test series consisted in multiplying each of 25 of these same figures by 7, instead of adding 17 as in the training series. Here the stimulus is the same in the training and control material, while the response is different. The test series necessitates the formation of new connections and the consequent breaking of those formed in the training series. This is a condition analogous to that found in Experiment III, where the association process was changed from the naming of opposites to the naming of nouns to fit the adjectives. It will be remembered that in that case there was an interference. In multiplication by a two-place number there is a certain amount of identity with addition, in that the latter is involved as a part process, but addition plays no part in multiplication by a one-place number.

The results of this experiment are given in Table VII. Comparing the gains of the trained and control group in the test

series, we find the former gained 11.4 seconds and the latter gained 29.7 seconds. Taking the gain of the control group as typical of untrained subjects, we find an interference effect from the training amounting to 18.3 seconds. The probable error of this difference is 6.5, making the difference about 3 times its P. E.

Here again we have an interference resulting when the multiplication process requires the breaking of definite bonds formed by training in the addition process.

TABLE VII.

Influence of Training in Addition Upon Ability in Multiplication.

Subject	TRAINING SERIES		TEST SERIES			
			Trained Group		Control Group	
			Subject			
	Init. Perf.	Gr. Gain	Init. Perf.	Gr. Gain	Init. Perf.	Gr. Gain
A.....	109.2	52.4	.....	....	F 186.5	60.8
B.....	95.2	35.2	85.3	- 5.0	G 126.1	31.3
C.....	110.0	61.4	119.3	-19.4	J 132.3	26.1
D.....	242.0	191.2	205.4	19.9	L 101.3	12.8
					M 84.8	17.3
					N 168.7	29.6
Av.....			136.7	11.4	133.3	29.7
P. E.....				5.3		3.8

VII. THE INFLUENCE OF TRAINING IN ADDITION UPON ABILITY IN DIVISION.

The training series in addition is identical with that in the two preceding tests. The test series consisted in dividing a series of 25 numbers by 7 as rapidly as possible. This list of 25 numbers was obtained by multiplying each number in the addition list by 7. Since 25 numbers constituted only half of the original list of 50 numbers, there were twenty different arrangements of the numbers in this test as in the two preceding experiments. As before no errors were permitted.

In this experiment the processes involved in the test series show neither a specific situation nor a specific response in common with the training series. Neither is there the necessity of breaking

any specific bonds formed in the training series in adapting one's behavior to the test series.

The results are given in Table VIII. If one takes into account the reliability figure attached to the gain in the case of the trained and control groups in the test series, one finds no difference in the gain made by the trained and control groups. A difference of 1.8 seconds between 21.3 and 19.5 would be of no significance. We conclude that there is neither interference nor facilitation shown as a result of the training in addition.

TABLE VIII.

Influence of Training in Addition Upon Ability in Division.

Subject	TRAINING SERIES		TEST SERIES			
			Trained Group		Control Group	
			Subject			
	Init. Perf.	Gr. Gain	Init. Perf.	Gr. Gain	Init. Perf.	Gr. Gain
A.....	109.2	52.4	72.9	19.0	E 258.9	55.4
B.....	95.2	35.2	52.7	5.3	F 82.3	5.9
C.....	110.0	61.4	88.9	9.3	G 85.7	19.9
D.....	242.0	191.2	186.3	51.5	L 60.4	-1.1
					M 63.2	20.8
					N 76.8	16.3
Av.....			100.2	21.3	104.6	19.5
P. E.....				6.3		4.3

VIII. CONCLUSION.

The experiment as a whole is intended as an intensive study of the transfer problem, upon a small number of subjects, with material that can be analyzed into stimulus and response fairly easily. It aims to determine the influence of training in cases where the relation between the processes varies from close similarity to complete antagonism. It aims, further, to limit the transfer effect to specific bonds between stimulus and response by eliminating the more general and common sources of improvement. It will probably never be possible to analyze any process into terms of stimulus and response within the nervous system, where any real transfer must finally be located. But if the commonly accepted meaning be given to the terms stimulus, response, and bond or connection, the experiment seems to show the following:

1. Where there are no identical bonds between stimulus and response in the two processes, the influence of one test upon another will be neither positive nor negative, i. e., there will be neither transfer nor interference. (Cancellation of 3 and 5—Cancellation of 4-7 group; Addition-Subtraction; Addition-Division; possibly Color Naming—Form Naming.)

2. Where there are identical elements in the two situations, or where a given process involves one or more bonds previously formed, there will be a positive or transfer effect. (Cancellation of 3 and 5—Cancellation of 3-5 group.)

3. Where one test necessitates the breaking of previously formed bonds and the formation of new ones, there will be a negative effect or an interference. (Opposites—Adjective-Noun; Addition-Multiplication.)

TWO CHILDREN'S PROGRESS IN SPEECH.

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I. INTRODUCTION.

This paper is the second on the general subject of the speech of children, being a continuation of an article showing the progress made in this direction by the author's daughter, Jane, up to the twenty-eighth month. The new material extends the observations concerning Jane to the thirty-sixth month, and presents those of her younger sister, Anne, through the first year.

II. BIOGRAPHICAL.

The elder of the two children whose methods of acquiring the language of the race are here recorded was three years old March 14th, 1914, having been born at Tientsin, China, on that date in 1911. Nine months later she arrived in the United States with her parents, who since that time have lived chiefly in Montana, where Anne, the baby of the family, was born at Missoula, November 26th, 1912. Both the parents are college graduates and university teachers, the father of English-Welsh descent, the mother of English-Dutch-German. The children then are mostly English in inheritance, clearly showing this ancestry by their physical and mental characteristics. They are, however, in two lines of the fourth generation born in this country.

Both children have been continuously with their parents, living always in or near cities. They have not been much with other children, but have met many grownups at home and abroad, mostly of the university community. Both are systematically trained in self control and self help, their parents' attention being especially directed to this and to their health. They did not, therefore, receive any special instruction in speech, or other mental attainments, until Jane had passed her third birthday, after the taking of the vocabulary for that year. At that time Jane performed quickly, and correctly, all the modified Binet tests for children four years old and one of the tests for the next

year in age. She could have been taught to do others of these tests very easily, as was shown somewhat later when she drew circles, squares, and diamonds at will.

Both children have had almost perfect health since birth; the younger affected with the mildest of colds as literally her only ailment during the first twenty months of her life. Jane has not been quite so fortunate, but has had very little illness. Both are large, sturdy, and hard, the personification of health and happiness. Table I shows their heights and weights at successive periods.

TABLE I.

Jane	Birth	12 mos.	28 mos.	36 mos.
Height in inches.....	19	29.25	35.5	37.5
Weight in pounds.....	8	22	32.2	34.1
Anne				
Height in inches.....	20	29		
Weight in pounds.....	8.5	22.25		

III. METHOD OF ACQUIRING DATA.

The same methods were used as described in the previous paper, except that three weeks were required instead of two.

During the three weeks beginning with the third birthday, somebody was with the child constantly, father, mother, or student assistant. All that the child said was recorded on large sheets of paper, but during the later part of the period words known to be already recorded were not written down. The vocabularies were compiled from these papers. The child was engaged in conversation on occasion to draw out infrequently used words, and was sometimes asked the names of objects, etc. An effort was made to have words in the earlier vocabularies used. In all cases only the spontaneous talking was recorded, but not obvious imitations of nursery rhymes, etc.

This time the child was more conscious from the beginning that her conversation was under closer scrutiny than usual, and after a few days understood what was going on. She then asked frequently if certain words were noticed, coming sometimes to repeat a word with the explanation, "I know that." She wished to see the written slips and examined them with great care in an apparent effort to discover what it all meant. In addition she

was particularly solicitous about "bridge," asking her father many times one afternoon if he had it down. After this she lost interest, and for the greater part of the three weeks took little further notice of the experiment. Some authors seem to see some danger to the validity of the results in such an interest on the part of the child, but none could be detected here.

IV. VOCABULARIES.

In the compilation of these vocabularies, the same principles were followed as before. Briefly these are as follows:

1. No proper nouns.
2. No variants of verbs and adjectives, except a few of the verb "to be."
3. All forms of pronouns are included.
4. No plurals unless the singulars were not used.
5. The same word is listed twice or more according to its grammatical use by the child.
6. Shortened and coined words are in quotation marks.

ANNE'S VOCABULARY AT TWELVE MONTHS.

Nouns —ball, chow, daddy.
 Verb —see.
 Adjective —dear.
 Adverbs —down, good-bye.
 Interjections—boo, hello.

JANE'S VOCABULARY AT THIRTY-SIX MONTHS.

- A. Nouns—animals, apple, appetite, apron, arm, ashes.
 Verbs—am, ask.
 Adjectives—a, afraid, all, another, any, asleep, awake.
 Adverbs—again, almost, all, alright, around, away, awfully.
 Prepositions—about, at.
 Conjunction—and.
 Interjection—ah.
- B. Nouns—baby, back, bacon, bag, ball, banana, bark, basket, bath, bath-room, beans, bear, bed, beef, beets, bell, belt, bench, bib, bit, bite, bird, birthday, biscuit, blackberry, blanket, block, boiler, bone, bonnet, book, bouquet, bottle, bowl, box, boy, bread, breakfast, bridge, broom, bruise, brush, buckle, butter, button, buttonhole.
 Verbs—bake, bark, be, become, bite, blow, break, bring, brush, build, bump, button-up.
 Adjectives—bad, better, big, blue, both, broken, brown.
 Adverbs—back, beside, better.
 Preposition—by.
 Interjections—bang, boo.
- C. Nouns—cabbage, cake, can, candle, candy, cap, car, card, carrots, cart, cassara, casserole, cheek, cherry, cheese, chick, chicken, chin, chocolate, cat, cellar, chain, chair, charcoal, chow, clock, closet, clothes, clothes-line, clothes-pin, coal, coal-bucket, coat, cocoa, coffee, collar, cold cream, comfort, comb, corn-bread, cookie, cork, cotton,

- couch, crack, cracker, crayon, cream, cream pitcher, crumbs, crust, cube, cup, cupboard, curtain, custard.
- Verbs—can, can't, capsize, carry, catch, choke, chop, clean, come, cook, cool, cough, crawl, cross, crow, cry, cut.
- Adjectives—chocolate, clean, cold, cotton, cracked, crooked, cute.
- Adverbs—careful, careless.
- D. Nouns—daddy, darning, date, dessert, desk, diaper, dimple, dining-room, dinner, dirt, dish, ditch, dog, doll, door, drainer, drawer, draught, dress, dressing-gown, drink, drum, duck, duster.
- Verbs—dance, deserve, do, don't, drag, drain, draw, dress, drink, drop, dust.
- Adjectives—dark, dear, dirty, dizzy.
- Adverb—down.
- E. Nouns—ear, edge, egg, elastic, elbow, enough, everything, eye, eyebrow.
- Verbs—eat, excuse, expect.
- F. Nouns—face, feather, finger, fingernail, fire, fish, floor, flower, flour, fly, foot, fork, fun, fur, furnace.
- Verbs—fall, feel, fetch, fill, find, fit, fix, fly.
- Adjectives—fat, first, four, full, funny.
- Adverb—farther.
- Preposition—for.
- G. Nouns—garter, girl, glass, gloves, goat, goose, go-cart, "gran" (grandma), grape-juice, grease, ground.
- Verbs—get, give, go, grunt, gulp, gurgle.
- Adjectives—gold, good, great, grimy.
- Adverbs—good-bye, good-night.
- H. Nouns—hair, hand, handle, hammer, "hankie" (handkerchief), hash, hat, head, heat, heel, high-chair, hole, home, hook, horn, house, horse.
- Verbs—hammer, hang, have, hear, help, hit, hold, hunt, hurt, hurry.
- Adjectives—hard, heavy, hot, hurt.
- Adverbs—hard, here.
- Pronouns—him, his, he, her.
- Interjections—hello, ho, hush.
- I. Nouns—ice, icing, iron.
- Verbs—iron, is.
- Adjective—imaginary.
- Pronouns—I, it.
- Preposition—in.
- Conjunction—if.
- J. Nouns—jacket, jam, jar, jelly, juice.
- Verb—jump.
- Adjective—juicy.
- Adverb—just.
- K. Nouns—key, kiddie, kindling, kiss, kitchen, knife, knob.
- Verbs—keep, kick, kiss, knock, know.
- Adverb—kind-of.
- L. Nouns—lace, lamb, lap, leaf, leg, leggings, lesson, letter, library, lid, light, lips, "lots."
- Verbs—laugh, lay, lean, let, lick, lie (recline), like, listen, lock, look, love.
- Adjectives—last, little, long, lost, lovely.
- Adverbs—level, like, lot.

- M. Nouns—macaroni, machine, man, marble, mat, matches, matter, mattress, meadow-larks, meat, milk, minute, monogram, moon, mother, mountain, mouth, mouthful, muff, mush.
Verbs—make, mean, meet, move, muss, must.
Adverb—more.
Pronouns—me, mine, my, myself, my-own.
- N. Nouns—nail, nose, neck, needle, new-skin, night, nightgown, noise, “nap-kum” (napkin).
Verb—notice.
Adjectives—nasty, naughty, new, nice.
Adverbs—no, not, now.
- O. Nouns—onion, orange, owl.
Verb—open.
Adjectives—old, one, other.
Adverbs—off, on, out outside, over.
Prepositions—of, on, over.
Interjections—oh, ouch.
- P. Nouns—page, pail, paint, pan, panties, “pan-sweep” (dust-pan), paper, party, path, pease, peeling, pencil, penny, petticoat, people, piano, picture, pie, piece, pig, pillow, pillow-case, pin, pipe, plant, place, plate, plenty, plug, pocket, poker, pot, potato, prunes, pudding, pussy.
Verbs—pat, peek, peel, pick, play, point, poke, pop, pull, put, push.
Adjectives—pink, precious, pretty.
Adverb—please.
- Q. Adverb—quick.
- R. Nouns—racket, raisin, rattle, register, rice, ride, ring, rock, rockingchair, rompers, room, rooster, rubber, rug.
Adjectives—raw, red, ready, round.
Verbs—rain, reach, read, ride, rock, run.
Adverbs—round, right.
- S. Nouns—salt, salve, samples, sandal, sauce, schoolside, scissors, screen, screw, seeds, sheep, shirt, shoe, shoe-lace, shovel, sink, sister, sled, sleeve, slipper, snow, soap, sock, something, sound, soup, spanking, spider, spinach, spoon, squeaker, star, steam, stencil, steps, stink, stick, stone, stool, stove, strap, strawberry, string, stuff, suei' chow, sugar, sun, sunshine, swatter, syrup.
Verbs—say, scratch, see, sew, shall, shave, shove, shut, sing, sit, sizzle, sleep, smell, sneeze, spank, spill, spit, sport, squeak, squeeze, stand, stay, step, straighten, strike, stop, suppose, swat, sweep.
Adjectives—shut, sick, soft, such.
Adverbs—so, some, sure.
Pronoun—she.
- T. Nouns—table, table-cloth, tablet, tail, taste, tea-pot, tea-party, tear, tear, teeth, thing, thimble, thumb, tea, thread, tie, time, toast, toe, toilet, tonight, town, towel, toys, tomatoes, tongue, train, tray, tree, trousers, trunk, tub, tube.
Verbs—take, talk, tear, thank, think, thread, tickle, tie, touch, turn, try.
Adjectives—that, the, this, thirsty, three, tight, tired, two.
Adverbs—through, today, tonight, too.
Prepositions—there, through, to.
Pronouns—them, they, that, this.
Interjection—there.

- U. Nouns—umbrella, underwear, university.
Verb—undress.
Adverbs—under, up.
Preposition—up.
Pronoun—us.
- V. Nouns—vase, vaseline.
Adverb—very.
- W. Nouns—waffle, wagon, waist, walk, wall, wash-rag, water, way, wheel, whiskers,
wind, window, wood, wood-pile, word, wringer, wrist.
Verbs—wake, walk, want, wash, watch, wear, weave, will, write, would.
Adjectives—well, wet, white, woolen.
Adverbs—when, where, while, wide.
Preposition—with.
Pronouns—we, what.
Interjections—well, whoa, whoop.
- Y. Adverbs—yes, yet.
Pronouns—you, your.

The following table shows the number of words of each initial letter classified as to grammatical form, the total number of words beginning with each initial letter, and finally the total number of words in the vocabulary.

TABLE II.

Initial	Nouns	Verbs	Adjectives	Adverbs	Pronouns	Prepositions	Conjunctions	Interjections	Total
S.....	50	29	4	3	1	0	0	0	87
C.....	56	17	7	2	0	0	0	0	82
B.....	46	12	7	3	0	1	0	2	71
T.....	33	11	8	4	4	3	0	1	64
P.....	36	11	3	1	0	0	0	0	51
W.....	17	10	4	4	2	1	0	3	41
D.....	24	11	4	1	0	0	0	0	40
H.....	17	10	4	2	4	0	0	3	40
L.....	13	11	5	3	0	0	0	0	32
M.....	20	6	0	1	5	0	0	0	32
F.....	15	8	5	1	0	1	0	0	30
A.....	6	2	7	7	0	2	1	1	26
R.....	14	6	4	2	0	0	0	0	26
G.....	11	6	4	2	0	0	0	0	23
N.....	9	1	4	3	0	0	0	0	17
O.....	3	1	3	5	0	3	0	2	17
K.....	7	5	0	1	0	0	0	0	13
E.....	9	3	0	0	0	0	0	0	12
I.....	3	2	1	0	2	1	1	0	10
J.....	5	1	1	1	0	0	0	0	8
U.....	3	1	0	2	1	1	0	0	8
Y.....	0	0	0	0	2	2	0	0	4
V.....	2	0	0	1	0	0	0	0	3
Q.....	0	0	1	0	0	0	0	0	1
X.....	0	0	0	0	0	0	0	0	0
Z.....	0	0	0	0	0	0	0	0	0
	399	164	75	52	21	13	2	12	738

Table III shows the percentage each part of speech is of the total number of words.

TABLE III

	Nouns	Verbs	Adjs.	Advs.	Prons.	Preps.	Conjs.	Ints.	Total
No.....	399	164	75	52	21	13	2	12	738
Pct.....	54.07	22.22	10.16	7.05	2.84	1.76	.27	1.63	100

In Table IV is shown the number of words beginning with each initial sound.

TABLE IV.

Sound	No. of Words	Sound	No. of Words
K	76	N	21
S	72	Th	20
B	71	O	17
P	51	Ch	14
T	44	E	12
D	40	Sh	11
H	40	I	10
L	32	Wh	8
M	32	J	8
F	30	U	8
W	30	Sc	5
R	29	Y	4
A	26	V	3
G	23	Q	1
			<hr/> 738

Proper Nouns—Bateman, Billie, Bobbie, Dr. Bolton, Miss Edmonds, Fido, Grandranch, Gretchen, Jane, Mr. Landmaid, Lennes, Mrs. Lombard, Mammy, Patsy, Percy, Sam, Miss Selfidge, Mrs. Siebert, Smith—nineteen in all.

If these were included in the vocabulary they would increase the total to 757, of which the proper nouns would constitute 2.50 per cent.

V. DISCUSSION OF VOCABULARIES.

Number of Words—At twelve months Anne used nine words, while her sister at the same age used ten. The following vocabularies for one-year-olds have been published:

TABLE V.

Authority	Reference	No. Words	Nouns	Verbs	Adjs.	Advs.	Interjs.
Hall.....	7	24	19	2	0	0	3
Mickens.....	9	3	2	0	0	0	1
Moore.....	10	6	6	0	0	0	0
Pelsma.....	12	10	7	1	0	1	0
Perez.....	13	10	6	2	2	0	0
Tracy.....	14	10	6	0	2	2	0
Tracy.....	14	8	7	0	0	1	0
Bateman.....	1	10	5	2	2	0	1
Bohn.....	2	7	7	0	0	0	0

The average of the number of words in the vocabularies is 9.77; if the highest and lowest are left out, the average of the six remaining is 8.7, practically the same number comprising Anne's vocabulary. While the number of observations is small, it begins to appear that the ability to use 9-10 words at one year may furnish another form to show the mental development proper at this age.

Eight vocabularies appear to have been published for children three years old.

TABLE VI.

Author	Ref.	Total	Nouns	Verbs	Adjs.	Adv.	Prons.	Preps.	Conjs.	Interjs.
Gale.....	6	1176	675	238	143	53	33	17	7	10
Pelsma.....	12	681	406	147	65	31	14	9	1	8
Whipple.....	15	1771	993	391	209	89	33	24	8	24
Heilig.....	8	2135	...	...	...	...	...	...	...	...
Boyd.....	14	1657	918	344	200	109	30	29	21	6
Bush.....	5	1994	1042	506	214	75	50	33	11	14
Nice.....	11	1205	691	246	139	62	30	21	7	9
Brandenburg.	3	2282	1171	732	198	98	36	20	12	15

Of these, that published by Boyd does not give a detailed vocabulary.

The average number of words is 1612. This is much higher than Jane's vocabulary of 738 words. Of the eight, however, that given by Pelsma is the only one based on the principles of elimination as used in this paper. Whipple includes proper nouns, variants of verbs and adjectives, as well as a number of onomatopoeic sounds and queer interjections. All together these words number 190, leaving 1571, or over twice 738.

Whipple states that Richard, whose vocabulary he is discussing, was "perhaps somewhat farther advanced in general physical and mental development than the average child of his age," and again "that the vocabulary is apparently much larger than the average for the age." The list furnished by Gale contains very few words which would have been excluded from Jane's vocabulary, and therefore is about half as large again as the latter. This author believes his lists to be too small, and fixes "700 words as a typical vocabulary for a two-year-old child," with a nearly doubling of this during the first half of the third year. Pelsma, who emphasizes that Elizabeth, the subject of his paper, "is in every way a child of only average ability," declares these figures too high since "the average for two years as published in the lists

above is only 518, for three years 1209, and for four years 1149." These figures are changed somewhat by recent publications to 1419 and 1818 for the latter ages, but the argument probably still holds good.

In Heilig's lists classes of words are added, some or all of which would be excluded from all the other lists. The surplus of 530, which would not be counted in Jane's vocabulary, includes an unusually large number of proper nouns, past and present participles. Alice, too, judging by her interesting musical ability, is decidedly precocious in this direction at least, and recalls accounts of musical *Wunderkinder*. Again, all words were counted in which were used over a period of five months, during the last three of which especial attention was paid to recording every word known to the child. In this respect the vocabulary is not comparable to the first three cited. Bush's vocabulary was culled over even a longer period, six months. Boyd's was not complete until two months after the birthday.

By such methods all "once words," which do not come into permanent use until much later, are included in the vocabularies many of which may be mere imitations used with little understanding. The two methods give quite different results. By using only a comparatively short period, a fairly complete cross section of the child's status in speech is obtained for certain ages. By using long periods of time the result is a sort of resumé of what has been done and is doing. The one method is naturally incomplete in that it fails to catch some infrequently used words and lists others which will be "once words" tomorrow. The time element minimizes the latter, however. The other method catches almost all the flotsam and jetsam. Numerically they act in opposite directions. The lists compiled according to one method may be said with more or less truth to show the child's status at three or four years, but the other method really sums up the activity between certain months. Furthermore, shortening the time does not seriously impair the size of the vocabulary, since by far the larger part is used during the first few days of observation, certainly during the first few weeks.

In compiling their vocabularies Nice adds proper nouns but Brandenburg adds proper nouns and inflections of verbs and adjectives. The former author states that "it is misleading to include past tenses and present participles in the vocabulary of

any child who can form them well. As some three-year-olds do not inflect their verbs, it should be noted whether or not they do, but the vocabularies need not be inflated." Certainly it would appear in the opinion of other observers that plural forms should be added as well for the sake of consistency.

If all variants, proper nouns, etc., are added to Jane's vocabulary, it amounts to 1086 words. This includes also the names of the letters O, T, and A. In these signs she took much interest shortly before her third birthday, wishing to learn more of them. Her interest was, however, diverted to simple words.

If all words used by her and forgotten again for several months previously were added in, the total number would be considerably higher. In this connection the list of lost words noted later is interesting.

Brandenburg adds to his vocabulary a list of 183 words not used by the child during the taking of the vocabulary but used previously as remembered by the parents. This the author calls "the sub-conscious vocabulary." It would seem to be a rather doubtful proceeding, since it is difficult to tell whether a word is forgotten or only "pigeon-holed." The author's children appear to have really lost words entirely from the memory and have had to learn them over again as new concepts. In many of the children examined more than once, numerous words present in one vocabulary have been missing from another. If the "sub-conscious vocabulary" is large it provides pitfalls for a treacherous memory.

As regards rate of progress, 333 words were acquired in 226 days, or an average of three words every two days.

Considering the above facts it seems still true that we have too little and too conflicting data upon which to base an estimate of vocabulary size normal for children three years of age. The earlier published vocabularies are usually those of somewhat precocious children. We need many more studies of children as normal as possible for their ages in order to be able to fix any norms for their stages in speech development.

Number Vocabulary: At three years of age Jane made few mistakes in number relations up to four, the error being in connection with the latter figure. "Lots" was used for larger numbers. She frequently used "six," "nine," like "sixty," "a hundred," but had not the faintest idea as to their meaning, for which reason they have been excluded from the list.

Color Vocabulary: Blue, brown, pink, red, and white comprise the list. This is an increase of three terms, since only pink and white are found in the earlier vocabulary. All the above terms were used correctly in the majority of cases, while a few others—black, yellow, orange—were tried experimentally on various colors, though queerly enough none of these words were used during the three weeks the taking of the vocabulary was in progress. Whipple's boy used twelve color names and six terms such as dark, etc. The case reported by Gale shows the use of seven terms. Wolfe's (16) results show that five-year-old children recognize yellow the least readily of the primary colors including black and white. At least seven published vocabularies show that this term was not used at two years (indeed no color terms were used at all in three of these cases). Of the so-called secondary colors, green, orange, purple, none of Wolfe's forty-eight cases of five-year-old children could name the last, and only four named orange correctly. So tardy are children in general in acquiring those terms that Binet and Simon consider the correct naming of red, blue, green, yellow, as a mental test distinctive of the eight-year.

Pelsma's child knew an unusual number of color terms at three years of age. This the author attributes to the fact that "E's" mother used paints very frequently, thus interesting the little girl. This has not worked out in just this way with Jane, for while her mother, too, uses painting materials frequently, and Jane herself has always played with pastels and water colors, she seemed to take little interest in the color names themselves, and made many errors in tentative efforts to use them.

Parts of Speech: As was the case in the earlier vocabulary, the verbs form a larger part of the whole than found with any other child or group of children yet reported, the same being true of the adverbs. The disproportion between the nouns and verbs is less, however, than before. "What are you doing?" is Jane's favorite question, rather than "what's that?", which may account for the figures.

The following table shows the changes in this respect as well as the progress made during the first three years of life.

TABLE VII.

Parts of Speech	12 Months		28 Months		36 Months	
	Number	Per cent.	Number	Per cent.	Number	Per cent.
Nouns.....	5	50	205	50.62	399	54.07
Verbs.....	2	20	95	23.46	164	22.22
Adjectives.....	2	20	47	11.60	75	10.16
Adverbs.....	0	0	31	7.65	52	7.05
Pronouns.....	0	0	12	2.96	21	2.84
Prepositions...	0	0	5	1.24	13	1.76
Conjunctions...	0	0	0	0.00	2	.27
Interjections...	1	10	10	2.47	12	1.63
Total.....	10	100	405	100.00	738	100.00

The conjunction "and" was the first of this class, and not used until the thirtieth month.

Coined Words: Like practically all children Jane is constantly using many original expressions. They do not appear in the above list since they are not allowed to become fixed in the child's memory, the correct expressions being substituted. Many of them are ingenious, some even with a touch of "heaven-sent cleverness," but since the memory associations form so readily they are scarcely ever repeated by the parents. To show how habits of this kind persist, it may be mentioned that since she was ten months old Jane has had a white, woolly sheep, her most treasured possession. This she called at that time a "dog," her class name for all animals, and it is still affectionately termed the "dear old doggie." Now she knows well enough that it is not a dog and has learned to forestall visitors' surprise by informing them that it is a sheep-dog, a term she coined herself of course with no idea of making a pun.

In this connection mention should be made of a short list of sounds used by both children as a sort of private code. These had little resemblance to ordinary English words, and are difficult to reproduce phonetically. One, "ungoon," seemed a sort of signal to inform each other of their whereabouts. Another, "huwee," always caused gales of hilarious giggling. They were used but little when grownups were around, and lasted but a short time, so no adequate record of them was obtained. The whole thing was interesting as suggesting the beginning of an invented language.

In many cases names were invented for objects, such as "pan-sweep" for dust pan. Sometimes these names were surprisingly

good, showing much observation on the part of the child. Indeed she often correctly saw analogies between things which had not before appeared to her parents in that light.

Objectionable Words, etc.: "Darn," lasting but a short time, has been replaced by the almost worse "awful." But when everybody, including professors of English, qualify everything under the sun with this over-worked word, who can blame the child for thinking things are awful, too? An effort to replace "lots," which was acquired early, by "much" and "many" is succeeding slowly. Naturally many ungrammatical terms are used, but they do not become permanent parts of the vocabulary, some of them needing only a single correction to disappear. "Lie" and "lay" are now used correctly.

Lost Words: All of the words used in the twelfth month are found in the succeeding list, but 39 words or 9.6 per cent. of the second vocabulary are not found in the third. An attempt was made to discover why these words had been lost, with the following results:

The vocabulary taken at twenty-eight months was in the summer time during July, while that of thirty-six months was taken in the late winter, March. This accounts for the loss of the following words, all summer terms: grass, honey, lawn, mosquito, rake (verb and noun), sticker. The "cabinet" was in the house but a short time; the present house has no "coal-shed"; the pup was stolen; "darn" was executed; no "ribbons" were in evidence; "kerplunk" became bang, chick chicken, nightshirt nightgown, and button changed to button-up. As to the other lost words, no reasons could be seen for their disappearance. Moreover, the child has used many words for short periods which do not appear in any of the vocabularies. Changes of all kinds necessarily go on all the time in the materials the child has for self expression.

New Words: Since the increase in the vocabulary was over three hundred words, it was not found possible to remember which were old and new during the three weeks needed to compile it.

VI. THE ACQUISITION OF SPEECH.

Anne—Anne's salutation to the world, expressed in very lusty fashion, consisted of short high-pitched cries not particularly expressive. In less than a minute they ceased abruptly, after

which the new-comer appeared quite comfortable, being discovered a few minutes later complacently looking at the light and chewing her fist. For about ten days the crying was like that described above, done apparently to do something rather than to express any emotion. Indeed the little life was so well regulated that there was small need to show hunger, pain, or discomfort. The "exercise cry" habit was instituted during the first week, at first in the nighttime, but training induced her to transfer this effort to the afternoon. After a few weeks two main styles of crying were to be distinguished, one the loud, more or less good natured, kind, in which were tried out different methods of vocalizing; the other of a low pitched, intermittent, fussy character, which ended when any attention was paid her.

During all of this no definite vocal sounds were heard, but the first of such was used during the eighth week. This was the long sound "A." Almost immediately the first consonant was prefixed to this, resulting in "ba." In a few days "o" was added together with "m"; after this all varieties and combinations of sounds were practised upon in very rapid succession. A great deal of this did not seem to be consciously directed, since the consonants prefixed to one vowel sound would change at random with accidental movements of the lips and tongue. On many occasions a new combination would catch the child's attention and be almost the only sound used for some time. Out of this grew in about the sixth month an especially favorite diversion; the repetition of variations on "uggle-guggle-guggle." During this time was developed, also, a beautiful, true vocal trill.

It was difficult to fix upon the first conscious imitation, but it was in full swing during the first part of the seventh month. Anne was anxious to imitate all done by her older sister, who in turn paid the baby the same compliment, although in a somewhat scornful spirit. The first word used with an appreciation of its meaning was "daddy," employed on the very day the youngster was ten months old. The next attainment was "ball," used proudly on all possible occasions, mostly mal-apropos, to which finally as a means of defense the grown-ups retorted with "shoe." The mild irony of this method or manner was readily perceived by Anne, who in a few days broke herself of the worst of the "ball" habit. On her first anniversary Anne was using nine words correctly and imitating many of those she heard used

around her. Her enunciation was good, but there was a tendency to leave off the final sound.

In general it may be noticed that Anne passed through the same stages in the same order as her sister before her, except that she reached the various stages in acquiring speech somewhat earlier than the latter.

VII. PROGRESS IN SPEECH.

Jane—Since her twenty-eighth month, Jane has gone on increasing her means for expression, using the same methods as outlined in the earlier paper. By imitation, observation, practice, and asking questions, she has acquired words, grammar, and ideas. The number of new words was on the average about three for every two days, although there was nothing regular about the rate. Some days there would be a flood of new terms, while during other periods the acquisitions were correspondingly sparse. Sometimes the rapidity of learning led to confusion. Thus on one evening she learned to use "hook" (for garments) and "elbow" correctly. The following morning, however, she began calling her elbow her hook and continued to do so for some time in spite of correction, later on using both names for the elbow, while giving a hook its proper name. In the same way at Christmas she confused "oyster" with some portion of her anatomy, but which part was not ascertained, since it seemed to be at different times her back, side, or shoulder. The derivation of "squeak" for her abdomen is obvious. In this connection it might be mentioned that Jane took a particular interest in feet, holding conversations with her own, ascribing emotions to them, blaming them for leading her in forbidden places, etc. She betrayed much surprise and interest in discovering her father's feet to be built on the same plan as her own. G. Stanley Hall, who has commented on this trait in children, found it not uncommon.

The amount of energy used by children in speech activity has often been spoken of. Hundreds of words will be uttered in an hour, including a large number of different words. In the course of a day the total number of words used is very large, especially with talkative children. In Jane's case it was found impossible to accurately determine these figures, long-hand not being sufficiently nimble to catch every word. On one occasion from a

twenty-minute count approximately three hundred and sixty words were heard, over two hundred being different. At this rate eight thousand to ten thousand words would be used in a day.

The gain in definite concepts for words noted has undergone another step forward. It may be remembered that "dog" was used first in its proper meaning, then applied to nearly all moving objects, next as a class name for animals, finally restricted to its proper place. These changes occurred during the fourteenth to the seventeenth month. In the thirty-second month the word "animal" was first used correctly as a class name, such expressions as "that cow is a animal" and "is the rooster a animal?" showing that the child had a very definite idea as to its meaning.

In grammar there has been a steady progress. At the beginning of the fourth year all parts of speech were in use including conjunctions which were not used at twenty-eight months. The parts of speech occurred in the following order: an interjection was the first word used, but nouns were the first as a class employed in the tenth month, verbs next in the eleventh, adjectives in the twelfth, adverbs fourteenth, pronouns sixteenth, prepositions seventeenth, conjunctions thirtieth. This order corresponds closely with that determined by other observers, except that the conjunctions appeared later than in most vocabularies. As regards sentences, the writer is of the opinion that practically all, if not all, of the child's talking has been done in sentence form. Even when only one word was uttered it was accompanied by gestures or actions, or inflected in such a way as to disclose that it meant complete thought. Just what was meant in many cases was not grasped by the parents, but in others the play of expression on one word came to mean very definite things to both them and the children. The word "drink" meant "I want a drink" or "give me a drink," when used with a certain expression; but said "that is a drink," "here's a drink," or "you are drinking," spoken with another inflection. In the sixteenth month combinations of two words were used such as "want drink," "go out," "I go," "your hat." At twenty months these had developed into "I want a drink," "you are going out?" "I'll go in the bathroom." Next, after an interval of confusion and apparent retrogression, longer and more complete sentences of many types were in use in the twenty-sixth month. Finally

with the addition of conjunctions in the thirtieth month, still more complex sentences were possible. As is the case with most children, parts of speech were interchanged, especially nouns and verbs, but this tendency grows less with age. At three years the distinction between adjectives and adverbs was clearly felt as shown by the use of careful, carefully, etc. Ungrammatical terms are used by applying to new words the rules already found to be true, such as joining regular forms to irregular verbs and plurals, or vice versa. "Flyed," "goed," "tooths," "feets," "cowses," and the like are used by all children as well as expressions like "I are," and "Did he went?" A single correction frequently eliminates some of these, although others are more persistent. In an environment of good English, however, none become permanent parts of the vocabulary except that even cultured parents sometimes injudiciously foist upon the child by repetition many of these oftentimes quaint expressions, which only become a nuisance to it later on. In this connection the persistent use of diminutives by many persons is as unwise, the child being forced to live in a world of "horsies," "doggies," "dollies," "pussies," "footsies," "toesies," "housies," until he gains the idea that English is built on the plan of the children's familiar "pig-Latin."

Of the factors entering into the acquisition of some words and the neglect of others, the difficulty of length or enunciation seems to be the least potent. In this vocabulary the use of such words as casserole, imaginary, library, monogram, and university among others illustrate the point, and examples are to be found in all vocabularies published. Whipple and Gale believed service, ability, and interest, or the emotional content, to be more important factors than ease of pronunciation. With regard to enunciation there is again little to note. Always speaking very distinctly, on her third birthday Jane could imitate almost perfectly anything said to her. The word napkin still presents some difficulty, but has changed from "nakum" to "napkum," so that the difficult "pk" sound has been overcome. For some time it was thought that pillow and the like were perfectly pronounced but later it was found that the real sound used was "plo," a very much shortened sound of "i" being heard. Later still this became "pidlo," while Billy was called "Biddy." This was corrected shortly after the third birthday. The consonant

sounds in the middle of words between two vowels are the most difficult to enunciate clearly, besides the above examples "v" being converted into "b" being noted. Other difficult sounds, "th," "s," "r," have caused no trouble especially as initial sounds. The most of the latter at thirty-six months were K, S, B, P, T, D, H, as contrasted with the order K, B, S, P, H, T, at twenty-eight.

VIII. MIND CONTENT.

At twenty-eight months Jane's answers to such questions as "What is a hat?" "What do you do with a spoon?" and "What are your feet for?" showed only associative memory, no true definition, and little mind content for individual words. At regular intervals these questions were repeated and answered in the same way until one evening in the thirty-fourth month. Then in answer to "What are your feet for?" she replied "To walk with on the ground. See my feet; there's your feet." Responses of this kind were rare, however.

The following shows some examples obtained at thirty-six months:

animal—The dog's a animal and the sheep.
bed—I go to sleep in my bed.
bathe—We go in the tub.
cup—Is to drink with.
chair—There's a chair. It's a rocking chair.
feet—To walk on. My feet jump.
handkerchief—To wipe my nose with.
shovel—I play with it.
tub—Jane gets clean in the tub.
trousers—Why do *you* wear trousers?

Thus in eight months some gain in concept has been won and considerable advance made in general comprehension of the questions asked and the kind of information expected. As is the case with all reported answers given by children in this way, the above replies are usually couched in terms of action related to concrete objects, and have no resemblance to the academic definitions given by older children in the grades and high school. It may be noted, however, that in many cases as complete definitions are made as are possible with the child's limited linguistic material. Webster's definition of "cup" is "a small vessel used

to drink from," and of "handkerchief" "a cloth to wipe the face with." Here the child's definitions are approximately as good, while they fail entirely with shovel, for instance. Again, even dictionary makers have much trouble with many words often the most commonplace, so that a child's definition of big as "big is big—a big book—and it isn't little now," does not fall so far behind the "bulky, large, huge," etc., of the dictionary.

Such conversations with the child are most interesting as showing its range of thought and ideas, its appreciation of fact, its emotions and interests, its correlation with life, as well as the new materials necessary to foster further mental development.

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ABSTRACTS AND REVIEWS

KARL PEARSON. *The Life, Letters, and Labors of Francis Galton. Volume I.* Cambridge: University Press; New York: G. P. Putman's Sons, 1914. Pp. xxiii, 246. \$5.60.

The application of modern doctrines of heredity to the development of the human race bids fair to be the most important movement of the coming generation. Charles Darwin through his promulgation of the principles of evolution in the development of species revolutionized the prevailing conception of animal and human life. But it is possible that the next few decades will see a change of attitude toward social relationships that will be of even greater importance than the influence of Darwin and his followers. Ten years ago there would have been little question as to which was the more significant figure in the history of human thought—Charles Darwin or Francis Galton. At the present day, evolution is taken for granted, but the mechanism of evolution advocated by Darwin is frankly questioned by biologists, while the founder of eugenics seems to be merely coming into his own.

It is well then that we should have this complete and authentic biography to supplement Francis Galton's own account of his life. As might be expected, the present biography differs widely from the traditional life story, in that great pains are taken to trace those elements in the remote ancestry of the hero which contributed to his accomplishments. Moreover, since the book is intended as a scientific monument to the memory of the master, and as it is compiled by the Director of the Eugenics Laboratory as a tribute to its founder, many details are included, not for their popular appeal, but for the sake of the complete narrative. No account of the ancestry of Francis Galton on his mother's side could fail to include much that is of interest and importance for an understanding of the life of his cousin Charles Darwin, so that the present book furnishes the most authentic picture of the hereditary influences that contributed to both these heroic thinkers. The book contains an abundance of plates presenting photographs of prints, silhouettes, facsimiles, letters and other material, all significant in understanding Galton's heredity.

The present volume carries the account from Galton's birth in 1822 to his marriage in 1853. The picture of his early life and his student years is constructed largely from Galton's own letters, and the letters and comments of members of his family. It must be borne in mind that Francis was the last child in a family of nine and that several members of the family were characterized by a remarkable longevity. Galton himself was 89 years old when he died. Two brothers lived to be 94 and 89, and of two sisters one died at 93 and the other at 98.

In childhood, Francis Galton was distinctly precocious, but with the advent of boyhood and school years this start seems to have been lost. At Cambridge, Galton scarcely found himself on a par with his fellows, and overwork resulted in a breakdown which seriously affected his subsequent career. His genius ripened late, and at one time it seemed that he would subside into the mediocrity of a country gentleman and contribute nothing of distinction to the increase of knowledge. The flowering of his scientific activities is reserved for consideration in a second volume. Accompanying the first volume are five pedigree plates, giving in graphic form the ancestry and collaterals of Francis Galton and Charles Darwin.

J. C. B.

THE JOURNAL OF EDUCATIONAL PSYCHOLOGY

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EDITORIAL

Granting that English, natural science, social science, and art constitute the four corner stones of a liberal education, the question arises whether the present teaching of these subjects produces the best possible results, and in what ways it might be improved. In the past three or four decades, the amount of time and attention devoted to English in elementary and secondary curricula has exceeded that allotted to any other subject, and many critical students of education are beginning to inquire whether the results are commensurate with the expenditure of time and effort.

It is generally admitted that the two essential aims in the study of English from the first grade to the college are the development of such skill in the use of the vernacular that it becomes a ready tool for the oral and written expression of ideas, and a wide acquaintance with and appreciation of the best in literature. To what extent present courses and methods attain these ends and in what respects the teaching of English might be improved are fertile fields for inves-

tigation. In recent years we hear much about the need for training in oral composition. Several suggestive plans have been outlined, and teachers are making tentative efforts to organize this work in the upper elementary grades and in the high school. As yet, however, these projects suffer much from vagueness and lack of standards. No one has any definite idea as to what should be expected in oral English from the fourth grade pupil, the sixth grade pupil, the high school freshman, or the high school senior. We need measures of central tendency for each of the elementary and high school grades, and indications of the amount of variability about this central tendency.

In written composition the work on and with the Hillegas and Ballou scales has done much to clear the ground and enable us to appreciate the difficulties with which we are confronted. Most of this work, however, has been done with eighth grade pupils, and we still have no norms of performance for the various grades. Moreover, in the teaching of English composition the chief stress is laid on the illustration of certain grammatical and rhetorical principles, and little is done to develop standards of competent performance in the minds of the pupils.

Experimental studies and common-sense reflection unite in showing that too much time is spent in elementary schools on oral reading, and insufficient attention is given to training pupils in rapid and comprehending silent reading. Instead of a single basal reader and a few supplemental reading books for each grade, children should be not only encouraged but required to read from fifteen to twenty books per year. This would demand a much more careful study and grading of children's reading according to their abilities and interests, and would insure acquaintance with one hundred to one hundred and fifty books at the end of the elementary course. Time for this reading could be secured by the elimination of the waste in spelling, which recent studies have shown to be considerable, and by the relegation of formal grammar to the university.

The same principles of fluency of expression and wide reading in literature apply to English in the high school, and we need to know much more definitely to what extent these ends are attained at the present time, and whether changes in method would not produce better results. If we are to believe the teachers of college freshmen, there would seem to be decided room for improvement in the high school composition work; and it is difficult to conceive what sort of emotional appeal is made to adolescent pupils by the ordinary high

school courses in literature. Judging from the casual statements of the pupils it would seem that the usual effect of high school studies in literature is to stifle rather than awaken a love for good reading. In any event, there are dozens of problems in the teaching of high school English which call for critical and experimental investigation.

J. C. B.

NOTES AND NEWS

One of the most elaborate and thorough contributions that has yet been made to the subject of vocational education and vocational guidance is to be found in the recent report of Dr. David Spence Hill, director of the division of educational research, New Orleans public schools, in connection with the organization of the Isaac Delgado Central Trades School for Boys. The report contains a preliminary survey of the industrial activities of the southern Mississippi valley with particular reference to the hundreds of occupations related to the mechanical industries. There follows a detailed and elaborate account of the author's personal inspection and study of the representative local establishments in the following industries: metal manufacturies, power, light and heating plants, electrical manufacturing and construction, lumber manufacturing, the local building trades, the printing and publishing industry, sea food culture, scientific agriculture and horticulture for city boys, and miscellaneous local industries. There is a plan for co-operation with the United States navy in the training of naval machinists, engineers, etc., a study of the desirability of a department for negroes, and an account of responses obtained from labor unions. Related to the educational aspect of this vocational survey is an investigation now being made by the Division of Educational Research into the causes of the elimination of children from the public schools. The survey shows careful and painstaking study, and contains much material that will be of general interest beyond the confines of New Orleans.

The Johns Hopkins University announces the George Peabody Scholarship in the Department of Education, open to men and women who are residents of the southern and southwestern states of our Union. The income of the scholarship is two hundred and seventy dollars per annum. Applications must be filed before March 1, 1916.

Another step towards the creation of a teachers' college in Baltimore was taken in the recent establishment of the degree of Bachelor of Science in Education by the Johns Hopkins University. The curriculum leading to the new degree will be based on the college courses

for teachers and the summer courses. The degree will be open to men and women on equal terms. Professor Edward F. Buchner has been appointed director of the courses leading to the new degree.

At Teachers' College, George Washington University, a demonstration school was opened during the past year in Saint John's Church Orphanage. Classes for practice teaching are provided in all the grades of the elementary school. At the same institution practical work in the Binet tests was started during the past year in connection with the courses in laboratory psychology. This work will be extended next year, and the plan is to enlarge it into a psychological clinic.

The Harvard University Division of Education announces two courses in play and recreation, by Mr. George E. Johnson, formerly director of playgrounds, Pittsburgh, Pennsylvania, author of "Education Through Plays and Games" and other publications on play and recreation. One of these is a technical course for teachers, playground directors, and social workers, and will present opportunities for field work, practice and research. The other is a general course for all those interested in the play movement, and will present the biological, educational, and social aspects of the play, and the relation of play to the conservation of desirable racial characteristics, to growth, and to social institutions. Mr. Johnson will have the cooperation of Mr. Joseph Lee, president of the Playground Association of America, and of Dr. Joel E. Goldthwaite, lecturer on orthopedic surgery in the Graduate School of Medicine, Harvard University.

George Peabody College for Teachers has received \$8,500 from Miss Eleanor Cuyler of New York City and Mr. Thos. DeWitt Cuyler of Philadelphia, for equipping the Jessup Psychology Laboratory. This amount of money is to be spent for furniture, laboratory equipment and psychological publications.—*Science*.

In the School of Education of the University of Pittsburgh the following extensions of work have been arranged for the coming academic year: Supervision of practice teaching will be required of all regular members of the faculty, first, in order to increase the amount and improve the quality of the supervision itself, and second, in order to bring the courses in educational theory into closer rela-

tions with the work of the student teachers and with the educational needs and conditions of the community. Dr. George Ellis Jones of Clark University has been secured to conduct courses in School Hygiene and in the Psychology of Industrial Education. Dr. Jones has made investigations in Tuberculosis among School Children and in Training in Education, and has recently been doing research work on Military Hygiene for the Carnegie Peace Foundation, in collaboration with Dr. Wm. H. Burnham.

The School of Childhood which has hitherto limited its training to children of Kindergarten age will broaden its scope to include the first two grades of the elementary school. Its problem is twofold; first, to work out the best type of training for children below school age; and, second, to unify the work of this early period with the work of the first two grades, thus eliminating the chasm which now exists very generally between the kindergarten and the primary grades. To conduct this enlarged experiment Miss Meredith Smith who has been studying and teaching in several departments of Teachers College for a number of years has been appointed Assistant Professor of Childhood Education and made head of the department of Childhood Education which includes the School of Childhood as its laboratory.

Special researches in the department of Educational Psychology, to be conducted by fellows in the department, include a study of border cases of mental defectives, the relation of fatigue to certain phenomena of adolescence in girls. For the first time a course is offered in "The Junior High School" in the Department of Secondary Education, by Dr. T. J. Kirby. This is a course dealing with the organization, curriculum, and principles of teaching which should obtain in a junior high school. It is a graduate course but open to advanced or experienced undergraduates.

The American Psychological Association held a joint meeting with Section H of the American Association for the Advancement of Science at San Francisco, August 3-6. The first meeting, on Mental Tests in Their Pedagogical Significance, was held in connection with Section L, Education, and the American Association for the Study of the Feeble-Minded. The following papers were presented: Lewis M. Terman, The Stanford Revision of the Binet Scale; Helen Thompson Woolley and Charlotte Rust Fischer, A New Scale of Mental and Physical Measurements for Adolescents and Some of its Uses;

Grace Helen Kent, A Graded Series of Geometrical Puzzles; L. W. Fike, Tests for Prospective Students of Stenography; Mrs. V. C. Hicks, Various Degrees of Success in Public School Training of Mental Defectives; Grace M. Fernald, Results of Tests with Specific Cases with Emphasis on the Study of the Delinquent Type; Olga L. Bridgman, The Result of Mental Tests upon Dependent and Delinquent Children in San Francisco. At other sessions of the Association, papers of interest to educational psychologists were presented as follows: W. B. Pillsbury, Some Investigations on Memory for Sense Material; George M. Stratton, Creative Imagination in Boys and Girls; Eleanor Rowland, Psychological Tests of Reed College Students; Henry H. Goddard, The Mental Hygiene of the Backward Child; Edgar A. Doll, Prognostic Value of the Binet Tests; A. J. Rosanoff, Evaluation of Reactions in an Association Test Designed for the Purpose of Higher Mental Measurements; Robert M. Yerkes, Methods of Studying Ideational Behavior in Man and Other Animals; L. R. Geissler, Group Experiments and Introspective Exercises in Class Room Work; L. W. Sackett, Some Aspects of the Problem of Sequence of Subjects in Beginner's Psychology; Daniel Starch, The Measurement of Ability in English Grammar; J. E. W. Wallin, Age Norms of Psycho-motor Capacity.

At the San Francisco meeting of Section L, Education, American Association for the Advancement of Science, in addition to the joint session with the American Psychological Association, the following papers were presented: William Kent, Elements in the Teaching of Writing; William T. Foster, Reed College System of Scientific Grading and Credit for Quality; Walter B. Swift, Management of the Speech Defect Problem in the Public Schools; Paul H. Hanus, Measuring Progress in Latin; L. W. Sackett, Measuring a School System by the Buckingham Spelling Scale; L. B. Sears, Spelling Efficiency in the Oakland Schools; L. Edgar Coover, Formal Discipline; Edward K. Strong, Jr., Some Notes on the Learning of Arithmetic; and David Spence Hill, Survey of Industries in Mechanical Occupations in New Orleans by the Division of Educational Research.

Among the papers presented at the Eighth Congress of the American School Hygiene Association at San Francisco the following are of interest to educational psychologists: W. H. Burnham, A Health Examination at School Entrance; Guy S. Millberry, The Education

of the Child in Oral Hygiene; Samuel G. Dixon, Some Results of the Health Inspection of 400,000 Rural School Children in Pennsylvania; Frederick L. Hoffman, Statistical Evidence of Physical Progress or Deterioration of School Children; Walter S. Cornell, A System of Sanitary School Inspection with Graded Standards and Exact Rating of School Buildings; W. F. Snow, The School and the Social Hygiene Movement; C. E. Rugh, The Educational Basis for Sex Instruction; and H. H. Goddard, The Hygiene Value of Grading a School According to the Intelligence of the Pupils.

Mr. George Eastman, president of the Eastman Kodak Company, is to build for the city of Rochester at a cost of about \$300,000 a free dental dispensary. Announcement of the gift was made at a meeting of the Rochester Dental Society, which for years has maintained free dental dispensaries in the public schools. —*School and Society*.

The governor of Indiana has appointed a commission to investigate the causes and prevention of mental deficiency in the state. The commission includes the superintendents of two state hospitals, the dean of the Indiana University School of Medicine, the superintendent of the Indiana Village for Epileptics, and the superintendent of the State School for Feeble-Minded Youths.

When the University of Oregon opens in the fall, it will undergo two "surveys." Dr. S. P. Capen, the government specialist in higher education, as official representative of the United States Bureau of Education, will be brought to the campus, probably early in October, and will remain until he is sure that he understands every phase of the University's activities. Then he will make a detailed report on its work. The other survey was ordered by the last session of the legislature for the guidance of the next session, and will be conducted by a joint committee of two houses. Its emphasis will probably be financial rather than educational.—*School and Society*.

Professor G. M. Whipple of the University of Illinois delivered at the University of Pittsburgh, August 16-21, a series of special lectures upon mental tests, mental heredity, exceptional children, efficiency in studying, and other topics in educational psychology.

A series of four public lectures on the Psychology of Music were given this summer at the Harvard Summer Session by Dr. Christian A. Ruckmich, associate in psychology at the University of Illinois. The subjects included: Some Psychological Aspects of the Origin of Primitive Music, Rhythm and Eurhythmics, the Memory of Absolute Pitch, and Psychological Tests of Musical Ability.

Herbert Lee, M. A., University of London, now principal of the high school at Oxnard, California, has been appointed principal of the university high school in Oakland, California, toward the support of which, as a training school for practice teaching by the candidates for a high-school teachers' certificate, the University of California will hereafter make a grant of \$10,000 per annum, the Oakland school department defraying the remainder of the expense of the school. Charles E. Rugh, professor of education in the University of California, will serve as director of the school.—*School and Society*.

At the University of Pittsburgh the following appointments in the School of Education are announced for the coming academic year: George Ellis Jones, A. M., Ph. D. (Clark 1913, 1915), of Clark University, assistant professor of education; Miss Meredith Smith, B. S., A. M. (Columbia 1914, 1915), of Teachers College, Columbia University, assistant professor of childhood education; Miss Marguerite L. McLean, A. B., M. S. (Wisconsin, 1907; Columbia, 1915), of Teachers College, Columbia University, assistant professor of household economy. Miss McLean was formerly a member of the faculty but for the past two years has been doing graduate work in Teachers College. In the same school the following promotions have been made: Gardner Cheney Basset, Ph. D., from assistant professor to professor of educational psychology and director of the psychological clinic; Cecil Kenyon Lyans, Ph. D., from instructor to assistant professor of the history of education; Thomas William Burckhalter, B. S., M. P. E., from instructor to assistant professor of physical education; Miss Adele May Jones, B. S., from instructor to assistant professor of household economy; Miss Mary Gloyd Waite, B. S., from instructor to assistant professor of childhood education.

In the school of education of the University of Pennsylvania, Ambrose L. Suhrie and Arthur L. Jones have been elected assistant professors of education. Mr. Suhrie was graduated from the Pennsyl-

vania State Normal School at California in 1900, and from the John B. Stetson University in Florida in 1906. From 1906 to 1910 he was professor of education and principal of the Normal College at Stetson University. In the latter year he became Harrison fellow in education at the University of Pennsylvania and received the degree of Ph. D. in 1913. In 1914 he went to the State Normal School at West Chester, Pennsylvania, as professor and dean of the department of education. Mr. Jones was graduated in 1893 from Iowa College at Grinnell, and for two years remained there as an instructor in biology. In 1895 he became instructor in biology in the Minneapolis High School, and two years later became superintendent of schools at Redwood Falls, Minnesota. After several years of service, he resigned to take graduate work in education at Columbia University, where he held a fellowship for three years. In 1907 he was elected professor of education at the Rhode Island Normal School at Providence; he was called in 1911 to the chair and departmental headship in education at the University of Maine.—*School and Society*.

Professor H. H. Foster, Ottawa University, Ottawa, Kansas, has accepted the position of head of the department of education in the University of Arizona.

At the University of Washington Dallas D. Johnson, director of the training school at the State Normal College, Bowling Green, Ohio, has been named assistant professor of education to succeed Professor J. K. Hart, who will be on leave of absence next year, and who is not expected to return to the university.—*School and Society*.

Dr. F. K. Sechrist, who received his doctorate from Clark University in 1913, has been appointed instructor in primary education in the University of Cincinnati College for Teachers. Miss Frances Jenkins, assistant editor of the Riverside Readers, has also been added to the faculty as supervisor of elementary grades and instructor in methods.—*School and Society*.

Dr. F. J. Kelly, director of the training school of the Kansas State Normal School, at Emporia, has been appointed dean of the school of education of the University of Kansas. He will retain both positions for the present. The double appointment is considered an important step toward unifying the teacher training system of the

state. Dr. Kelly graduated from the University of Nebraska in 1912, and took his doctorate at Columbia in 1914. During the years 1902 to 1908 he held positions of various types in the public schools of South Dakota. From 1908 to 1912 he was director of the Normal Training School at Spearfish, S. Dak. Dr. Kelly has done work on standardizing grades and on tests of silent reading.—*School and Society*.

William Webb Kemp, a graduate of Stanford and Ph. D. of Columbia, now professor of education in the University of Montana, has been appointed professor of school administration in the University of California.—*School and Society*.

Dr. Joseph Peterson, who recently resigned his professorship in the University of Utah, has been appointed professorial lecturer in psychology at the University of Minnesota.—*Psychological Bulletin*.

Frederick M. Gerlach, A. M., has been appointed instructor in psychology and education in Colorado College, and will be in charge of the experimental work in these subjects.—*Psychological Bulletin*.

Richard M. Elliott, Ph. D., instructor in psychology in Harvard College, has been appointed instructor in psychology in Yale University.—*Psychological Bulletin*.

Herschel T. Manuel has been appointed instructor in psychology and pedagogy at Clark College.—*School and Society*.

CURRENT PERIODICALS

PEDAGOGICAL SEMINARY. Vol. XXI, No. 4, December, 1914. EDWARD L. THORNDIKE. *Measurements of Ability to Solve Arithmetical Problems*. 495-503. Four simple arithmetical problems were presented to 4500 pupils of Grades 6-9 in Massachusetts schools. The pupils were given exactly ten minutes on each problem. The chief purpose of the experiment was to determine precisely how these problems compared in difficulty. This was done by comparing the percentages of correct solutions in ten minutes. Incidentally it was found that in the more difficult problems the boys were markedly superior to the girls, but as the problems grow easier this disparity decreases until on the easiest the disparity is slight. The younger children in each grade make better scores than the older children.

HARRIS L. LATHAM. *A Study of Falsehood*. 504-522. This is rather a study of the precise significance of the terms by which various aspects or shades of falsehood are characterized.

RUDOLF PINTNER. *One Hundred Juvenile Delinquents Tested by the Binet Scale*. 523-531. Of the sixty-three boys and thirty-seven girls tested in the Columbus Detention Home 46 per cent. were feeble-minded, *i. e.*, three or more years retarded. This is in accord with the results of several other investigations cited by the author. A large part of juvenile crime seems to be chargeable to stupidity.

ISIDORE KAYFETZ. *A Critical Study of the Hillegas Composition Scale*. 559-577. The author proposes "to determine the scientific validity of the [Hillegas] scale and its applicability for administrative and pedagogical purposes." To do this he gives a fairly complete account of the way in which the scale was constructed, quotes freely from Dall, Johnson, and other critics of the scale, compares one sample with the original from Washington Irving, and concludes that "the scale is wholly unsatisfactory and invalid from the scientific point of view for the following reasons: (1) The methods used in deriving the scale are faulty. They are purely statistical and not experimental-pedagogical. (2) The scale is not really an objective one, because it was derived by a statistical study of subjective data-opinions. (3) The judges determined the qualities of the compositions according to expert literary standards, not according to pedagogical standards. (4) The study was defective in its mode of procedure in that it lacked a preliminary series. (5) The selections in the scale do not represent real children's expression. (6) The scale regards the composition work of pupils merely from the standpoint of the result." [How much such criticism is worth must be left to the judgment of the intelligent reader.]

WILLIAM E. BOHN. *First Steps in Verbal Expression*. 578-595. A study of a girl's development in speech from the ninth to the twenty-

sixth month. The total number of words at 12 months was 7, at 18 months 207, at 24 months 657, and at 27 months 969. The detailed vocabulary is given month by month.

ROBERT BENNETT BEAN. *The Eruption of the Teeth as a Physiological Standard for Testing Development.* 596-614. A comparative study of 817 American children, 628 children of German extraction, and 776 Filipino children. The author gives the beginning and end of the eruptive period for each type of teeth for each of the three groups, listing boys and girls separately. The Americans and Germans stand close together, the Filipinos are more precocious. The time is then calculated at which approximately fifty per cent. of each type of tooth is erupted. There is a study of the relation between morphologic form and teeth, a consideration of the physiological standard, and an indication of the modal grade for each age. The author concludes that "no single factor, such as stature, or weight or the epiphyses of the bones, or the eruption of the teeth, or the presence or absence of secondary sexual characters, or any other factor, will be sufficient alone to establish the relative development of the individual."

Vol. XXII, No. 1, March, 1915. MARGARET MORSE NICE. *The Development of a Child's Vocabulary in Relation to Environment.* 35-64. This little girl uttered her first words in her 14th month. At 18 months her vocabulary contained 145 words, at three years 1205 words, and at four years 1870 words. The detailed vocabularies are given at each period, the results are tabulated according to parts of speech and difficulties of pronunciation, and the nouns are classified according to personal experiences, indoor environment, outdoor environment, people, pictures and stories, and abstract words.

MILDRED LANGENBECK. *A Study of a Five-Year-Old Child.* 65-88. At sixteen months this little girl had a vocabulary of 229 words, and at five years she had increased it to the remarkable number of 6837 words. Her mental age at five years, as indicated by the Binet tests, was eleven. The detailed vocabulary is given, and while the large number is due in part to the fact that each distinct meaning is counted as a separate word, *e. g.*, switch (n., tracks), switch (n., stick), switch (v.), the variety and quality of the words given amply attest the child's precocious development.

GEORGE C. BRANDENBURG. *The Language of a Three-Year-Old Child.* 89-120. Contains the vocabulary of 2282 words, a discussion of the child's speech development, and a complete record of her conversation for an entire day. The total number of words in the latter was 11,623, and the number of different words used was 859. The author produces evidence to show that playing with other children had a retarding rather than an accelerating effect upon this child's linguistic development.

ALICE C. HINCKLEY. *A Cause of Retarded Speech Development.* 121-146. A detailed study of the number and quality of errors of a

girl five and one-half years old who had previously suffered from adenoids, inco-ordination of movement, and protruding lower jaw.

No. 2, June, 1915. JOSEPH K. FOLSOM. *The Scientific Play World of a Child*. 161-182. An account, by a university student, of the complicated and highly systematized imaginary world of a child between the ages of five and eleven.

JAMES RICHARD GRANT. *A Child's Vocabulary and Its Growth*. 183-203. A study of the increase in a girl's vocabulary month by month from the twelfth (3 words) to the twenty-sixth month (1201 words). The complete vocabularies are given, there is a valuable comparative table of all vocabularies that have been reported of children from one to six years of age, and some interesting observations are made on phases of linguistic growth.

CHARLES B. LEWIS. *Etiology of Scoliosis*. 218-251. A summary of 121 discussions of lateral curvature of the spine, and a report of the author's examination of 1100 boys in the Worcester high schools. There is a detailed tabulation of the results of this examination, and the author makes a number of practical hygienic suggestions.

JEAN DAWSON. *Measuring the End-Product*. 290-295. Tests of high school graduates in the normal school show failure to recognize and discriminate common trees, plants, and weeds, to locate accurately ten important city buildings, or to locate familiar shops and theatres, so that a stranger could find them without difficulty. For these failures the author apparently holds the high schools responsible.

No. 3, September, 1915. FRANCIS LEE DUNHAM. *Somatic Development, a Criterion of Mental Measurement*. 305-325. Proposes the term "somatic development" in place of such terms as "anatomical age," "physiological age," etc., analyzes the facts of growth from the embryological and physical points of view, and discusses periods of growth, influence of ductless glands, development of the nervous system, pubescence, and the development of the teeth and of the osseous system.

EMERY L. KUHNS. *Experimental Study of Dynamic Periodicity as Influenced by Diurnal, Weekly, Monthly, Seasonal and Yearly Efficiency*. 326-346. A study in the records obtained from the use of the Smedley dynamometer for 560 days. Six measurements, three with either hand, were taken at seven stated times daily, and the subjects included, at different times, 12 students in addition to the author. There is a distinct diurnal course of efficiency, and a seasonal periodicity, but no weekly or monthly variation.

W. F. TIDYMAN. *A Critical Study of Rice's Investigation of Spelling Efficiency*. 391-400. A sweeping condemnation of Rice's procedure and interpretation of results. "The investigation offers little of direct, positive value to pedagogical theory and practice. Its greatest, and, indeed, its monumental service to education must be that it raised questions and stimulated experimentation and criticism of existing practices."

PUBLICATIONS RECEIVED

(Notice in this section does not preclude a more extended review.)

A Comparative Study of the Salaries of Teachers and School Officers.
Bulletin No. 658. Washington: Bureau of Education, 1915.
Pp. 126.

There is a discussion of the increased cost of living and its effects upon teachers, a comparison of the earnings of school workers with earnings in other occupations, a comparison of teachers' salaries with other school expenses, suggestions for conducting campaigns to increase salaries, and a special study of the salaries of elementary teachers.

MEYER BLOOMFIELD. *Youth, School, and Vocation.* Boston: Houghton Mifflin Company, 1915. Pp. xi, 273. \$1.25 net.

This is a statistical and administrative study of vocational guidance, not a psychological investigation. In the introduction President Suzzallo calls attention to the fact that the schools have always striven to prepare a selected few of the pupils for their life work, and states that the new idea is to extend this fostering care to the many. The complexity and increasing specialization of modern industry make the choice of a life-work a difficult matter, and in all too many instances the boy or girl blunders along without definite thought for the future. The author gives convincing evidence of the waste involved in such a procedure, describes the Boston Vocation Bureau, the Cincinnati, Newton, and other plans for meeting the needs of young people, presents in detail the organization of the work in Boston, and discusses vocational guidance in Germany and England. There are also chapters on health guidance and on the start in life, and the appendix contains almost 100 pages of "suggestive material."

ARTHUR CLIFTON BOYCE. *Methods for Measuring Teachers' Efficiency.* The Fourteenth Yearbook of the National Society for the Study of Education. Part II. Chicago: The University of Chicago Press, 1915. Pp. 83. 79c.

Chapter I presents a summary of current methods of measuring teaching efficiency in 242 cities of over 10,000 population. In 14 cities promotional examinations are held; in all the others teachers are promoted on the basis of some sort of rating of their teaching. Chapter II discusses studies that have been made as to the qualities of merit in teaching. Control and teaching skill rank highest, while

health and personal appearance stand at the lower end of the scale. In chapter III the author presents his "efficiency record,"—the scheme of points on which he believes teachers should be rated,—and in chapter IV he gives a number of illustrations of the use of the method, and discusses those points of the scheme that might become the object of criticism. Chapter V contains a statistical determination of the relative importance of qualities of merit, and chapter VI is a general summary. In the appendix is found the revised form of Elliott's score card, and the score card that was used in the Ohio survey.

FRANK PIERREPONT GRAVES. *A Student's History of Education*. New York: The Macmillan Company, 1915. Pp. xxvii, 453. \$1.25.

The author states in the preface that this book is not a mere condensation of his three volume work but has been written from the point of view of omitting theoretical and philosophical material and stressing the actual practices of education as an outgrowth of the life of the time. Another feature of the book is the condensation of the history of ancient and medieval education into the briefest compass consistent with a clear understanding of the important movements of those periods, and the allotment of over half the space to the educational developments of the past two centuries. There is an interesting chapter on formal discipline in which it is shown that the theory did not originate with Locke (except in his argument for mathematics Locke seems rather opposed to it) but rather goes back to the faculty psychology developed from Aristotle. There are chapters on the development of industrial education, on the psychological systems of Herbart and Froebel, on the growth of modern secondary education, and on the scientific movement in education, including scales of measurement and school surveys. The style is clear and attractive, and the author's aim, to afford the student a historical orientation with respect to the educational problems of his own time, has been admirably realized.

CHARLES W. HALE. *Domestic Science, Part I*. Cambridge: University Press. New York: G. P. Putnam's Sons, 1915. Pp. xi, 327. 90c.

The title of this book would seem to an American to be strangely misleading. It is true that in the preface the author gives warning that he proposes to emphasize the strictly scientific aspect of the "somewhat ill-defined subject known as domestic science," but for all that a casual inspection can reveal the discussion is as closely related to bridge building or the manufacture of liquid air as to anything that goes on in the home. There is a series of learned discussions on measurements of length, area, volume and weight, the con-

stitution of matter, work, power and energy, heat, air, oxygen, and the physical and chemical properties of water. It is an introductory work on physics and chemistry of the most formal type, and even the 145 experiments have nothing in them that pertains to the household. Such an unpsychological and unpedagogical treatment of any science cannot be too strongly condemned, for it defeats the fundamental purpose of all science instruction—the awakening of a lively interest in the subject discussed. It is to be hoped that the book may have some success in its avowed purpose of enabling English students to pass certain examinations, but it is more fervently to be hoped that we may forever be spared the need of such formal aids in this country.

JAMES S. HIATT. *The Truant Problem and the Parental School*. Bulletin No. 656. Washington: Bureau of Education, 1915. Pp. 35.

This monograph reports a study of 100 typical cases of truancy in Philadelphia from the points of view of nationality, age, sex, progress in school, mentality and home surroundings, and a survey of parental schools in thirteen cities with reference to their plant, maintenance, staff, curriculum, discipline and after care.

ELLA GILBERT IVES. *The Evolution of a Teacher*. Boston: The Pilgrim Press, 1915. Pp. xiv, 188. \$1.00 n.

A somewhat impressionistic, emotional autobiography presenting glimpses of Chicago at the time of the fire and Boston in the days of Phillips Brooks. There is no doubt about the religious earnestness of the writer, but the book would be much more satisfactory if the aura of religious emotionalism had been held in check by a passion for an accurate account of the writer's experiences.

FRANCES JENKINS. *Reading in the Primary Grades*. Boston: Houghton Mifflin Company, 1915. Pp. xi, 125. 60c.

The editor, in his introduction, after emphasizing the importance of reading in modern education as a means of unlocking thought for the child, says, "The monograph here presented bears on the problem of teaching primary children to read, a field where dullness has hitherto reigned. It is offered as a set of concrete, practical suggestions which the teacher may follow in the faith that it has the best of modern investigation behind its selection of methods." Chapter I contains interesting devices for training children to pick out the essential thought of the paragraph or passage read. In chapter 2, on problems of expression, the author emphasizes the need for training the child to know what good reading is and to evaluate his own reading and determine what is wrong with it. The remaining chapters deal with form mastery, special methods, the recitation period, the study period, and the teacher's attitude toward results.

CHARLES HUBBARD JUDD. *Psychology of High School Subjects*. Boston: Ginn and Company, 1915. Pp. ix, 515.

In this book the author breaks new ground, and sows the seed which in due time will bring forth the harvest of a reorganization of secondary school work upon the basis of the social and psychological needs of the pupils rather than upon tradition and prejudice. But before this day of harvest arrives much more experimental investigation will be needed than is now at the disposal of the author, and many of the statements here set forth will have become the objects of acrimonious discussion. Criticism, however, is what the author expects and invites, and, if it advances the cause of a psychological outlook on secondary education, he will be one of the first to rejoice. In two respects the book is somewhat disappointing: First, it is made up to a large extent of extracts from the writings of others, and, second, the chapters have no bibliographical references (other than citations of the sources of quotations) to afford students an orientation in the related literature. At times its tone is that of a polemic rather than of a scientific and dispassionate presentation of facts, but this only makes it more interesting and more likely to stir up controversy. In considering the specific high school subjects the author's general plan is to examine representative textbooks to discover the psychological development expected of the pupil, to analyze the statements made by writers on the methodology of the subject, and to appeal to observation in the classroom for evidence as to the actual mental behavior of pupils. The first six chapters are devoted to high school mathematics, then follow four chapters on language (including composition, English literature, and foreign languages), four on manual arts, industrial courses and science, one each on fine arts, history, generalization, and teaching how to study, and a final chapter on general problems of secondary education. It is a noteworthy book, and should receive careful consideration.

JOSEPH LEE. *Play in Education*. New York: The Macmillan Company, 1915. Pp. xxiii, 500. \$1.50.

It is refreshing to find a writer in these modern days who tells you at the start that he cares little for the practical. "My aim in this book is to present a true picture of the child. . . . The practical conclusions reached—though, like any conclusions upon this subject, they are important if sound—are of secondary interest." At the outset the reader is warned that the term play is to be used in a broad sense to cover practically all the child's activities, and the author voices his vexation that play usually carries the connotation of the opposite of work. Unfortunately, the sharp differentiation between instinct and reason smacks of a psychology that has little in common with recent studies of instinct and reason. The work is divided into five books, and contains forty-eight chapters. Book

one develops the thesis that play is growth, and expounds a general theory of play instincts. In the remaining four books the author describes the activities of what he considers the four ages of childhood: Babyhood, from one to three; the dramatic age, from three to six; "Big Injun age," from six to eleven; and the "age of Loyalty," from eleven on. Every chapter contains interesting material for reflection, although the initial conception of instinct leads to statements that are irritating to the critical student of child behavior.

ANNA M. LÜTKENHAUS. *Plays for School Children*. New York: The Century Company, 1915. Pp. xix, 283. \$1.25 net.

A collection of dramatic plays adapted for presentations by elementary school children. It includes "Master Skylark," introducing Shakespeare and his contemporaries, "Barnaby Lee," representing old New York in Stuyvesant's day, "Through the Looking Glass," from Alice in Wonderland, "Lady of the Lake," "Thanksgiving Day—1696," "Four Queens of England" (Elizabeth, Mary, Anne and Victoria), and fifteen other plays adapted from various sources, or constructed for special occasions. The book is a valuable addition to the increasing dramatic literature for schools.

THEODORE L. MACDOWELL. *State versus Local Control of Elementary Education*. Bulletin No. 649. Washington: Bureau of Education, 1915. Pp. 83.

"All States in the Union maintain systems of public schools, and in every State support and control of schools are divided between the State and local communities—county, township, district, municipality. In no two States is this division the same." The author has performed a valuable service in collating the scattered data on distribution of State school funds, restrictions upon their use, State aid, the rights of localities to borrow money and issue bonds, regulations of taxation, and State intervention in the local control of school affairs.

A. S. MACKENZIE. *The Evolution of Literature*. Thomas Y. Crowell Company, 1915. Pp. xvii, 440. \$1.50 net.

This is the second edition of a very interesting book on comparative literature. The author's point of view is anthropological and psychological, rather than strictly literary, and the book represents an effort to get at the common origins of literary expression. The earlier chapters deal with primitive man and the primitive literatures of Africa, Oceania, Asia, and America. The author then considers primitive art, early forms of the dance and drama, the primitive lyric, and primitive narration. The next seven chapters discuss barbaric literature in representative lands and its different forms.

Two chapters are devoted to autocratic literature, as found in Babylon, India, Egypt and Greece, and the remaining three chapters deal with democratic literature in Europe and America. The treatment of the material is novel and stimulating throughout.

MARTHA MACLEAR. *The Kindergarten and the Montessori Method*. Boston: Richard G. Badger, 1915. Pp. 114. \$1.00.

The sub-title of this book is "An Attempt at Synthesis." It is a brief treatise, based on genetic psychology, of the problems needing adjustment in this phase of education. It is written from the viewpoint of a teacher of the kindergarten and a close student of Montessori, but of one who has also had experience in other lines of educational work. The author urges that the kindergarten adopt Montessori's two fundamental principles of liberty and education founded on the spontaneous activities of the child. She pleads for "a general reversal of procedure, a complete change in methods and an addition to the material, as well as the discarding of much of the old material. . . . We need teachers who are not wedded to any one system of thought but who are keen seekers of the truth. . . . We need a changed curriculum in our training schools that we may turn out teachers who are capable of bringing the kindergarten into line with the best educational thought." The book is well constructed and should be carefully studied by primary teachers.

EUGENE F. MALOUBIER AND JUSTIN H. MOORE. *First Book in French*. New York: The Macmillan Company, 1915. Pp. xiii, 363. \$1.10.

This book is constructed on the traditional lines of first year language books,—detached sentences, vocabulary, questions to be answered in French, grammatical rules and composition exercises. In endeavoring to compromise between the so-called "inductive and deductive methods" the authors fail to meet the needs of either those who wish to learn to speak French or of those who desire merely a reading knowledge of the language.

LOIS KIMBALL MATHEWS. *The Dean of Women*. Boston: Houghton Mifflin Company, 1915. Pp. ix, 275. \$1.50 net.

A masterful discussion of practical problems in higher education of importance not only for those who are interested in the college life of women but for all those who are in any way connected with college administration. The author contends that the dean of women should have a Ph. D. degree, should have made contributions to some branch of academic learning, should have a limited amount of teaching to do, in order to keep in touch with the intellectual life of the students, should have a seat in the faculty and membership on important

faculty committees, should have sufficient personal charm and social *savoir faire* to enable her to be at ease in any social gathering and to make others feel at ease likewise, should be able to address an audience with confidence and vigor, and should establish such relations with women student organizations that her opinions and advice on any subject would be welcomed and listened to with respect. Among the topics dealt with are student employment, vocational guidance, student self-government, social life, student discipline, and the intellectual life of students. The author speaks from a background of rich experience, and her treatment of college problems is so sane, so broad-minded, so full of insight as to call forth the highest approval. If there were such things as reading circles in college faculties as among elementary school teachers (a thing which would vastly improve the discussions in faculty meetings) this book should head the list for the current year.

HUGO MUENSTERBERG. *Business Psychology*. Chicago: La Salle Extension University, 1915. Pp. xi, 296.

"The understanding of psychology," says the genial author of this volume in his preface, "is one of the most important roads to success for the modern business man. . . . It is the aim of this volume on business psychology to bring together those results of modern psychological thinking which are significant for the work of the business man. Yet business psychology too is, after all, psychology, that is, a science which needs serious and penetrating study. No one ought to believe that a science can be mastered in any other way than by serious study. Such a study involves, first of all, the laying of solid foundations. We must therefore plod through much material which seems at a superficial glance unimportant for a business man. The first half of the volume hardly speaks of buying and selling and advertising and selecting workers. It is devoted to a careful treatment of perceptions and memories and feelings, but this apparently unpractical study is needed if the later practical discussions are not to hang in the air." And yet, let it be said that this treatment is by no means dry or formidable, for almost every point made is illustrated by instances from business or industrial life in such a way as to appeal even to the most unphilosophical mind. Some of the later chapters deal with suggestion, the acquirement of abilities, the outer and inner conditions of efficiency, vocational fitness. Individual mental traits, the selection of fit individuals, and mental tests.

CLAUDE IRVIN PALMER AND DANIEL POMEROY TAYLOR. *Plane Geometry*. Chicago: Scott, Foresman & Co., 1915. Pp. v, 277. 80c.

"This text derives its origin and character from the view that geometry is a valuable study for high school pupils in the degree to

which they understand and appreciate it at the time they are studying it. Appreciation of the worth of what is being done and insight into the meaning of its tasks go very far toward a real motivation of geometry. . . . This text so organizes the material as to give a concrete, experimental, and somewhat informal approach to the rather highly wrought scheme of demonstrative geometry."

MORTON PRINCE. *The Psychology of the Kaiser*. Boston: Richard G. Badger, 1915. Pp. 112. 60c.

An interesting psychological interpretation of the relations of the Kaiser to the German government and people. The author believes that an important control of his conduct is a fear psychosis,—a suppressed and partly unconscious terror of Social Democracy and of all that its development would mean for him and for the autocratic principle which he embodies. The war is, of course, the most potent means of suppressing democracy.

HARRY FLETCHER SCOTT. *Elementary Latin: An Introductory Course*. Chicago: Scott, Foresman & Company, 1915. Pp. xx, 348. \$1.00.

Among the reasons that the author gives for the study of Latin are: (1) A large proportion of the words in the English language are derived from the Latin; hence a study of Latin is to a large extent a study of the history of our own language. (2) Latin is advised if not required in preparation for work in law, journalism, and engineering. (3) Latin is valuable for business life in that it enlarges the English vocabulary and affords training in the careful choice of words. (4) The appreciation of English literature is increased by the study of Latin. (5) Latin furnishes a foundation for the study of modern romance languages. (6) The Latin is one of the world's great literatures and can be better appreciated if read in the original.

W. G. SLEIGHT. *Educational Values and Methods Based on the Principles of the Training Process*. Oxford: At the Clarendon Press. New York: Oxford University Press, 1915. Pp. viii, 364. 4s. 6d. net.

The author is well known in psychological circles for the most thorough and carefully checked experimental study of the transfer of training in memory work that has yet been produced. In the present volume he summarizes his own and other experiments, defends the theory of the common element, discusses the development of concepts of method and of ideals, and in the last seven chapters applies the principles of mental training thus developed to the selection of subject matter for study and to the construction of the curriculum. His fundamental division of the curriculum is into prepar-

ation for work and preparation for leisure, and current teaching of subjects under each of these heads comes in for much caustic criticism. But the author advocates an evolutionary rather than a revolutionary change in the curriculum, and points out the modifications that are impending. The book is a scholarly and thoughtful production, and will do much to help on the psychologizing of education, which is now well under way.

E. M. SMITH. *Mind in Animals*. Cambridge: University Press. New York: G. P. Putnam's Sons, 1915. Pp. xii, 194. 90c.

The aim of the author is to present in simple form the essential features of recent experimental investigations in animal behavior. The fact that the manuscript had the benefit of the criticisms of such well-known psychologists as C. S. Myers and C. L. Burt is sufficient to bespeak for the book a favorable consideration. In chapter one, on protozoan behavior, the author draws largely on the work of Jennings, and in chapters two and three, on habit formation and associative memory the investigations of Yerkes, Watson and their pupils receive much attention. In the discussion of instinct the old terminology is used, but a critical attitude is taken and the treatment rests squarely upon an experimental basis. As a special type of instinctive response, homing is selected for detailed study, and the recent experimental investigations of bees, wasps, ants and pigeons are briefly reviewed. The work of Haggerty and others on imitation in monkeys is well summarized, and the book concludes with a survey of the evidence for and against intelligence and free ideas in animals. It is an excellent little monograph, and deserves the attention of educationists.

Statistics of Certain Manual Training, Agricultural, and Industrial Schools, 1913-1914. Bulletin No. 644. Washington: Bureau of Education, 1915. Pp. 79.

These statistics show the number of schools, pupils, instructors in manual training high schools and other industrial schools, the size of library, value of buildings, equipment and endowments and amount of expenditures for different purposes.

C. W. VALENTINE. *An Introduction to Experimental Psychology in Relation to Education*. Baltimore: Warwick and York, Inc., 1915. Pp. x, 194. \$1.10.

"In this little book an account is given of a number of psychological experiments which bear directly upon educational problems and on the work of the teacher in the school. All the experiments described can be carried out without any apparatus except such as can easily be made with pen and paper." Part I gives directions for

twenty-seven experiments on association, imagery, attention, economical learning, mental types memory, transfer of training, map drawing, the acquirement of skill mental fatigue, and tests of general intelligence. In part II one hundred pages are devoted to a discussion of the results of the experiments and their application to school children. The experiments are well selected and pertinent to school situations.

STEPHEN B. WEEKS. *History of Public School Education in Alabama.*

Bulletin No. 637. Washington: Bureau of Education, 1915.

Pp. 205.

The author traces the history of public schools in Alabama from 1819 to 1914. He shows how the dependence of the people upon the income from federal grants weakened their sense of responsibility for the schools and left them inert and apathetic when that income failed. There is a good picture of the effects of plantation life upon the planters and upon the whites connected with the plantation, in regard to their attitude toward education. The latter part of the monograph is devoted to a consideration of the results of the war, and to the new outlook for public school education in Alabama.

THE JOURNAL OF EDUCATIONAL PSYCHOLOGY

A NEW SCALE OF MENTAL AND PHYSICAL MEASUREMENTS FOR ADOLESCENTS, AND SOME OF ITS USES

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The scale to be reported in this paper is based on the idea frequently expressed that while no one test yields a satisfactory measure of ability, a group of tests probably does give a significant result. The scales now ready for use are for fourteen and fifteen year old native born white children. They are based on 750 fourteen year old children who were dropping out of school to go to work, and on 680 of the same children at fifteen years of age, after being at work for one year. The same tests have been given to corresponding groups of children who are remaining in school, but the scales for them are not yet ready for publication. The same series of tests, with minor modifications from year to year, is being given to the two sets of children at sixteen, seventeen and eighteen years. In order to check up this scale with one of the Binet type, the Yerkes Point Scale is also being given to as many as possible of the eighteen year old group. The accompanying lists will show just what tests are being used at each age, and the measures which enter into the summary scales at fourteen and fifteen.

¹ This paper is the work of the entire laboratory staff of the Vocation Bureau. All members of the staff have tested children, and evaluated results. Charlotte Rust Fischer and the Director have made up the tables of results, and worked out the percentiles. Edward S. Jones, Assistant Director, has estimated all the Pearson co-efficients of correlation.

For the details of methods of giving and evaluating the tests, we must refer to the Monograph on Mental and Physical Measurements of Working Children, No. 77 of the series of supplements to the Psychological Review.

The new scale is constructed as follows: First, each of the mental and physical measurements taken has been stated in terms of ten-percentiles for girls and for boys separately. This table of ten-percentiles is appended to this paper. Each child was then given a rank from one to ten (according to the percentile within which his results fell) on every one of his mental and physical measurements. The percentile ranks for each child were then averaged, first for the set of physical measures, exclusive of height and weight, and second for the set of mental measures. These percentile averages were in turn arranged in tables of ten-percentiles which are appended to this paper. (See tables of averages of percentile ranks and the percentile table of average percentile ranks.)

Any new individual to be tested can, then, be given the same series of tests on which the tables are based, ranked in each test according to the percentile within which his results fall; an

PHYSICAL TESTS

FOR ALL AGES FROM FOURTEEN TO EIGHTEEN YEARS

Vital Capacity

Grip

Right

Left

Steadiness

Right

Left

Tapping

30"—Right

Left

One min. Right

Left

Index of fatigue

Right

Left

Card Sorting

Index

MENTAL TESTS

14 YEARS	15 YEARS	16 YEARS	17 YEARS	18 YEARS
Cancellation Letter-a Index	Cancellation Letter-m Index	Cancellation Letter-w Index	Cancellation Letter-a Index	Cancellation Letter-m Index
Accuracy	Accuracy	Accuracy	Accuracy	Accuracy
Memory 7 place digits	Memory 7 place digits	Memory 7 place digits	Memory 7 place digits	Memory 7 place digits
8 " "	8 " "	8 " "	8 " "	8 " "
9 " "	9 " "	9 " "	9 " "	9 " "
Substitution	Substitution (different key)	Substitution (different key)	Substitution (different key)	Substitution (different key)
Practise pages	Practise pages	Practise pages	practise pages	practise pages
1	1	1	1	1
2	2	2	2	2
3	3			
memory page	memory page	memory page	memory page	memory page
4	4	3	3	3
Completion of sentences	Completion of sentences (different blank)	Completion of sentences (different blank)	Mutilated Text Time	Mutilated text (new form) Time
Correctness	Correctness	Correctness	Per cent correct	Per cent correct
No. of ideas	No. of ideas	No. of ideas		
Index of ideas	Index of ideas	Index of ideas		
Association time	Association time	Association time		
Association by Opposites (easy)	Association by. Opposites (medium)	Cause and Effect	Association by Opposites (hard)	Association by Opposites (easy and hard)
	Healy & Fernald	Per cent perfect	Hayes	Freeman
	Problem Box	Per cent correct	(Instruction)	Problem Box
	Opening	Healy & Fernald	Box	Time
	Time	Problem Box	(with diagram)	Moves
		Opening	No. trials	
		Closing	Errors	
		Time		
		Moves		
Construction puzzles		Construction puzzle	Construction puzzle	Construction puzzle
A & B (Healy & Fernald)		"Flower Pot"	"Chick"	No. 1
School series on- ly		"Egg"	"Ship"	No. 2
Time				"Aussage"
No. of moves				No. of correct ideas
				No. additions
				Recognition
				Positive errors
				Negative errors
				Hard Directions (Woodward & Wells)
				Time
				Per cent correct
				Additions
				Free Association (Kent-Rosanoff)
				Yerkes Point Scale

average of his percentile ranks can be taken, and this average placed on the general scale. This method places each individual in comparison with a large group of supposedly normal people of his own age and sex, somewhere between the poorest individual, who figures on the scale as one, and the best, who figures as 100.

The method of forming the scale is a very rough one. It could be improved by increasing the number, variety, and difficulty of the tests, and also by making divisions finer than tenths of the original series. Some of the methods of estimation could also be bettered. In a test like rote memory, for instance, it will probably prove desirable to take an average for all the series used, instead of a separate average for each length of series. In the substitution test it would perhaps be better to combine the records for all the practise pages into one measure, and use the record for the memory page as a second measure. As we discover which of the tests correlate most closely with general or special abilities, it will be possible to devise a system of weighting the various tests in taking an average. We now know, for instance, that association by opposites and the mutilated text test correlate better with general ability than the cancellation test. Finally, the value of the scale for general uses will be enhanced when the results for school children and those for working children are combined into a single scale. The present scale, it must be remembered, is a first attempt to formulate this kind of a standard, and is very rough in form.

But even in its present rough form, there are proofs that the scale yields information of great significance. In the first place the results for each individual are fairly constant from year to year. Even though the group of individuals on whom the fifteen year scale is based is not exactly identical with that for the fourteen year scale, and the tests also differ slightly the second year, the Pearson co-efficient for the correlation between the fourteen and fifteen year tests of each individual is .66 P. E. .038 for the physical tests, and .71 P. E. .034 for the mental tests. Shifts of more than 15 points on a scale of 100 are rare. In many instances the large shifts can be explained by special circumstances, such as additional school training, or ill health. The exact amount of shifting from year to year will be published when the series is complete.

The second proof of the reliability of the tests is the remark-

able degree of correlation between the school grade of the children and rank in the mental tests. The tables of averages of percentile ranks, give the details for type of school, sex, and school grade, for both mental and physical averages. Graphs 1 to 8 present the relation graphically. The graphs for the averages in physical tests show a small positive correlation with school grade, and those for the mental tests a large positive correlation, so large that the graphs for fifth and eighth grade children cross for only a small portion of their extent.

While the positive correlation with school grade is large it is by no means perfect, and it seemed worth while to make a study of the very exceptional cases. There was one small group of children who had completed only the fifth grade at fourteen years, who ranked higher in the tests than another small group who had completed the eighth grade at the same age. Supposedly the tests measure native ability rather than the exact amount of training a child has had, though it is of course impossible to make a sharp separation of these two factors. On this assumption we reasoned that the fourteen year old children whose tests showed good native ability, but who nevertheless had completed only the fifth grade, must have had unfortunate social circumstances which caused retardation in school, in spite of their superior endowment; while the group whose tests showed poor native ability, but who had nevertheless completed the eighth grade at fourteen years, must have had favorable social surroundings which assisted them through school in spite of inferior endowment. In order to test this hypothesis, we looked up in our files the records of the physical and educational history, and of the home conditions, of these exceptional children. We found our hypothesis absolutely verified.

The very exceptional groups were not large. There were eleven of the very superior fifth grade children—children who ranked 70 or above either at fourteen, or at fifteen, or both years; and there were seventeen of the very inferior eighth grade children, children who ranked 50 or below either at fourteen or at fifteen or at both ages. Of the well endowed children from the fifth grade, one had been retarded by illness. This child had a good home, and good parents, but she had had in the course of her fourteen years spinal meningitis, smallpox, typhoid fever, scarlet fever, measles, and several minor diseases. She is the

only child in this group who had a good home. There were only two others whose fathers were living. One of them was a saloon keeper, and the other an old clothes dealer. In both instances the family lived in the rear of the shop. The other children in this group belonged to families in which the father was dead or a deserter, and the mother a wage earner outside of the home. These children had themselves worked to earn money out of school hours. The families lived in a few rooms, and had shifted about so much in residence that not one of the eleven had been in one school throughout his school period. All but three of them had been in three or more different schools, and some of them in five and six different schools. The mothers of these children were reported to be uninterested in education, and anxious to have the children go to work.

The group of poorly endowed children who had completed the eighth grade at fourteen years presented a direct contrast in social conditions. There were only four of the seventeen whose fathers were dead. Two of these had lost their fathers less than a year before leaving school, and in the other two cases the record of the date of the father's death had been omitted. This group of children, then, belonged to families in which the father was the wage earner. Not one mother of this group was a wage earner outside of the home. Over half (10) of these families owned their own homes, while none of the families of the fifth grade group did. Over half of them had been in one school from the first grade to the eighth, and only three of them had been in more than two schools. But four of them had done any work outside of school hours, and in those cases it was insignificant in amount. The mothers were reported to be women who were interested in education and determined to keep their children in school at least through the eighth grade. Finally, in response to the question whether the child himself liked school, and would have preferred to stay in school if he could, over half of the well endowed fifth grade children replied in favor of school, while but one of the poorly endowed eighth grade children chose school.

To find the apparent anomalies in the estimates made by the scale so uniformly explicable on social grounds is an important piece of evidence in favor of the reliability of the scale as a measure of native mental ability.

The use of the scale has already yielded some interesting results.

1. We have made on the basis of the scale two group comparisons, one of sex and one of type of school. Since the final scales are made up separately for the two sexes, no direct comparison of sex can be based on them, except with regard to variability. A comparison of the percentile tables for the various tests shows that in most of the mental tests the girls are a little superior at this age. Tests of mechanical ingenuity of any type are a marked exception to this statement. The final scales, which are ten-percentile arrangements of percentile averages, furnish a basis for judging of the variability of the two sexes. If variability is measured by the difference between the five and the ninety-five percentiles, the differences in variability in the two sexes are small, and not entirely consistent. In the physical tests the boys are a trifle more variable at fourteen, and decidedly so at fifteen. In the mental tests, the boys are a little more variable at fourteen, while there is a somewhat greater difference in favor of the girls at fifteen.

There is one fact with regard to variability, however, which holds for all the series. The girls show a wider variation below the median than above it. That is to say, while the difference between the sexes in the total range of variation is slight and not always in the same direction, it nevertheless is true in every series that the girls show a greater number of very exceptionally poor individuals, and a smaller number of very exceptionally good individuals as compared with their own median, than the boys.

In comparing public and parochial school children, the original tables of results showed that in every test except rote memory the public school children were somewhat superior. The tables of percentile averages add one interesting fact, which is that a large proportion of children at both extremes come from parochial schools. Both the exceedingly stupid, and the exceedingly brilliant children are more numerous in the parochial than in the public school group. The predominance of parochial school children at the lower end of the series suggests that the parochial school is not as strict as the public school in weeding out defectives, or in refusing promotion from grade to grade on the ground of poor work. The predominance of parochial school children at

the upper end of the series is explained by the fact that a far larger proportion of the parochial school children drop out of school to go to work at fourteen years of age than in the case of the public school, with the result that our parochial school group contains more of the superior members of the school than does the public school group.

The percentile averages showed the same sex difference between the two types of school that we noted in the monograph. While the difference between the two sets of girls is very small, the difference between the two groups of boys is large. Various explanations of this fact have been suggested. The one which seems to us most probable is that the difference can be traced to the type of training given the two sets of boys. The public school boys have more athletics and manual training than the parochial school boys, and these subjects have a stimulating effect on boys. The training offered the two sets of girls does not differ so much. They each have a little sewing and domestic work, and not much else in the realm of the manual. Reports from foremen of machine shops, given me by Mr. Paul Kreutzpointer, educational secretary of the foundrymen's union, tend to confirm this suggestion in stating that parochial school boys are not as apt in shop work as public school boys.

Two other suggestions have been made, one that there is a sex difference in type of mind of such a nature that girls' minds respond naturally to the kind of training offered in parochial schools, while boys' minds do not respond, and are injured by it. The third suggestion is that the parochial schools take more pain in the training of girls, and give them more supervision than boys.

2. The scale has given us a new method of measuring the higher grades of mental defect. The children on whom the scale was based were all children who were at least sufficiently normal to stay in the regular schools up to fourteen years of age, and to complete at least the fifth grade. Nevertheless it is certain that some of them are high grade defectives, and a few of them rather low grade. In our series of tests at eighteen years, we are giving the Yerkes Point Scale to as many as possible of the working group. At the present writing (June 1915) we have fifty Yerkes records in addition to our five annual tests. Only the fourteen and fifteen year tests of these children are available in the form of percentile averages. Before trying the Yerkes

scale we had supposed that most of our young people would fall within the limits for normal adults, that is 75-100, while a few of our poorest ones would fall below. The fifty cases at hand form an unselected group in which there are a few more individuals above than below our median. To our surprise we found that 13 of them, or 26%, fell below 75, while 28, or 56%, fell below 85. The distribution of this first fifty cases is as follows:

Below 60 (i. e., 58)—1 case	71-75.....3 cases	86-90 .....12 cases
61-65.....4 cases	76-80.....10 cases	91-95 8 cases
66-70.....5 cases	81-85.....5 cases	96-100..... 2 cases

On the Yerkes basis, then, one fourth of our eighteen year old working children belong in the class of mental defectives, while a second fourth is made up of borderline cases.

The correlation of the Yerkes records with our own is not as close as we should have expected to find it. There is of course a decided positive correlation, though a few striking discrepancies occur. There were two individuals who ranked below the median in our tests but were above 85 on the Yerkes scale. One of these is a boy whom we already knew to be an exceptional case. His low rank in our tests was due entirely to his abnormal slowness. He has a remarkable degree of persistence which ultimately brings him success, but in our tests he failed in all the tests with time limits, though he insisted on keeping on until eventually he succeeded in the task. His slowness penalized all his records. It was evident in his association reactions also. The other case is that of a boy who was not far below our median. His tests have been improving decidedly from year to year, though he is certainly not of a superior type. Both of these boys had unusually good homes and English speaking parents.

There were three cases of children who ranked below 75 on the Yerkes scale, but were somewhat above the median on our scale. These were all children with foreign born parents. These results suggest that mere facility with the English language is a much larger factor in the Yerkes tests than in ours.

We have had one other method of comparing results obtained with our scale with those of the usual standards for mental deficiency. We tested by our system a number of the highest grade defectives from our school for defectives. The highest grade pupil the school ever had, who when we saw her at fifteen years tested 79 on the Yerkes scale, ranked 24% on our scale.

That is, there were 24% of our working girls of her age who tested lower than she. The next best pupil ranked just below twelve on the Binet scale, and was 18% on our scale. Most of the defectives, not the most hopeless ones, but those who were to some extent teachable, fell in the lowest five per cent of our scale.

These two sets of results, obtained from different points of view, agree in suggesting that from twenty to twenty-five per cent. of our series of working children would on our present standards be ranked as defectives. The lowest five or ten per cent. would be considered rather low grade morons, and the rest high grade morons. We can see no reason for regarding our eighteen year old working children as exceptional. Since they are all native born whites, most of them with English speaking parents, they probably stand higher in the tests than foreign born laboring people. If these preliminary findings are confirmed, it means that one fourth of our laboring population would on the present standards of measurement be classed as defectives, and if the Binet scale were used instead of the Yerkes, the proportion would be still larger, since the tendency is for Yerkes ratings of adolescents and adults to be higher than the Binet ratings.

The question to be faced now is whether these facts constitute a criticism of our working population, or of our standards for mental deficiency.

None of the children in our series is necessarily destined to industrial failure on the ground of mental defect. The girl who stood lowest of all on both scales (58 on the Yerkes system and 15, or 1% on ours) has worked steadily at simple hand work in a shoe factory for four years. At eighteen she is earning \$6.00 a week. A capable girl should be earning nearly twice that in one of the skilled jobs of a shoe factory after that amount of experience. Another girl, only a shade better in the tests, has worked for four years in a candy factory. At eighteen she is earning \$3.50 a week, and is still doing the most unskilled work. Candy factories pay much less than shoe factories, but this girl also should be getting nearly twice her present wage, after four years of steady work. Both these girls have good homes, and are carefully guarded. If they were thrown entirely on their own resources, they probably could not take care of themselves,

but so long as they are socially protected, they can contribute their quota to the family income. The boy who stood lowest has also worked steadily for four years, and is doing fairly well. Another of the lowest grade boys has been for four years with the same department store, and has risen from inside messenger at \$3.00 a week to driver of a delivery auto at \$13.00 a week.

Taken as a group, the inferior children shift about from job to job more than the superior ones, and have longer periods of unemployment. A glance over the list of jobs they hold show that they are of a lower type than those of the superior children. However, differences in mental ability and in amount of education are comparatively small factors in earning capacity during the first few years. There is no relationship between the school grade completed, and the average weekly wage during the first two years. Groups selected on the basis of rank in the tests show more of a difference in weekly wage. The median wage for the group of boys who failed worst in the tests is \$3.75 at fourteen years and \$4.75 at fifteen years, while for the group of boys who did best in the tests, the median wage is \$4.10 at fourteen years and \$5.62 at fifteen years. In measuring industrial fitness, then, rank in the tests is a more significant factor than school grade. The wage statistics for the girls apparently contradict this generalization. The median wage for the girls who stood lowest in the tests is \$3.40 at fourteen years, and \$4.87 at fifteen years, while for those who stood highest, the median wage is only \$2.85 at fourteen years, and \$4.43 at fifteen years. The contradiction is more apparent than real, however. It is explained by the aristocracy of the department store job. Department store jobs are the poorest paid in the city, and shoe factory jobs best paid, but the department store has its choice of the young workers. Nearly half of our girls who stood highest in the tests were working in department stores for wages varying from \$2.00 to \$2.50 the first year, and from \$3.00 to \$3.50 the second. None of the inferior group were able to hold jobs in department stores, though several of them had tried. A large proportion of the inferior group were in the shoe factories at much higher wages. Three of them at fifteen were earning \$7.00, \$8.50, and \$9.00, while the highest wage in the superior group was \$6.00. There is no social factor in boys occupations which corresponds to the lure of the department store for girls.

The exact facts about the relation between grade of intelligence as shown by the tests, and industrial careers, will be published later. Meanwhile we know enough about it to draw a few conclusions with regard to educational policy. It is quite certain that the poorest groups, those who test below standard on both systems, are children who could not profit by much academic instruction. We believe that very few of them could finish creditably, if at all, the work represented by our present eight grades. It is also quite certain that these children could be picked out by experimental methods several years, at least, before time for them to drop out of school. It seems the plain duty of the school to take these children out of the regular classes and give them industrial training for the type of work within their grasp.

In order to safeguard both society, and the most hopeless of these children, we need legislation to provide that as soon as any of the defectives become either delinquent or dependent, they shall be permanently segregated in institutions of an industrial type. Such institutions could be made almost or quite self-supporting.

3. The relation between manual ability and mental ability as shown by the tests offers some interesting suggestions. There is a positive correlation between rank in mental tests and rank in physical tests, but it is small. The Pearson co-efficient is .21 P. E. .064 at fourteen and .33 P. E. .060 at 15 years.

There must, then, be a certain group of children who stand high in the mental tests, and low in the physical and vice-versa, though there is a general tendency for the two to correspond. We can roughly distinguish five groups, poor in both respects, medium in both respects, good in both respects, very good in manual, and poor in mental ability, and very good in mental but poor in manual ability. If these relationships remain fairly constant for the individual, as our results indicate that they do, they furnish one basis for sorting children with reference to the type of training which should be given them.

As a democratic nation, it is our belief that children should be trained for the highest type of pursuit in which they have a fair chance of success. There are of course, many factors involved in success in life. It is by no means certain, for instance, that a child who has the necessary qualifications of mind and hand will

therefore succeed in such professions as medicine, or engineering. The point is, however, that without these basal qualifications he will certainly not succeed, and it is a waste of educational effort to try to make him.

Consider, now, our five rough groups. The individuals who stand consistently low in both respects seems destined for simple manual labor, or low grade industrial positions, provided they have the necessary physical strength. Those who are very lacking in mere strength as well, have slim prospects of being able to earn a living in the modern world. The group whose mental endowment is rather poor, or medium, but whose manual ability is good should be prepared for the skilled trades. Those who have a medium endowment of both kinds should be guided toward the great mass of secondary positions in business and industry. Those whose mental development is exceptionally good, but who are lacking in manual skill should be directed toward such professions as law, the ministry, literary pursuits, the non-experimental academic branches, the higher positions in business and finance, and some types of social work. Those who are gifted with exceptional ability in both directions, manual and mental, should be guided toward such professions as medicine, architecture, engineering, the experimental sciences, the arts, and certain types of social work.

If such a sorting into large groups could be made early, it would be possible to make modifications of our public school curriculum to meet their various needs. In the grammar school the important point would be to pick out early the children whose endowment is so inferior that they cannot profit by a high school course, and give them the kind of training which would best fit them for the industrial work within their grasp. Within the high school the task would be to separate those of medium mental endowment from the exceptionally good ones. The first class should have within the high school preparation for the very skilled trades, including domestic science and nursing, or for clerical or business positions, according to the strength of their tendency toward manual occupations. The second group should have college preparatory work with the stress on experimental science for those with a manual tendency, and on the humanities for the others.

Provided such a system were kept sufficiently flexible so that children whose diagnosis was uncertain, or those who developed unexpectedly could be shifted from one course to another, it would not be open to the criticism that an early sorting of the children into classes is undemocratic and fosters class distinctions. A sorting based upon native endowment, if it proves feasible, is fair to all. To make it effective, it should be supplemented by a system of scholarships for exceptionally gifted children of limited means.

Such a general classification makes no pretense of being able to single out ability in the higher arts. Supposedly the artist is to be sought in the group of individuals who are exceptionally well developed both manually and mentally, though we have as yet no experimental data on the relation between artistic genius and general intelligence. In our own series of children we have one young boy who is very much retarded in school, and very poor in the tests, who nevertheless has a degree of skill in painting which is at least commercially valuable. At fifteen he won a prize of \$200 for one of his pictures. To what heights he can rise remains to be seen. Doubtless special tests, such as Mr. Seashore's tests of ability in singing, could be devised for other fields of art.

4. We have already referred to the fact that native endowment, manual and mental, is but one of the determining factors in a career, though it is a very important one. The importance of general appearance, manner, style of dress, and such qualities as persistence, ambition, and social ease, is frequently impressed on us. In our fifth year series of tests we are trying to make a rough record of such facts about each individual. Meanwhile a few instances will illustrate the point.

We were particularly interested in the two girls who stood highest on our list for the first two years. They were both parochial school girls. The first one belonged in a family with a drunken father, a drunken step-mother, and some little half brothers and sisters. Her own mother had been a fine woman, and the girl was pretty, well dressed, and attractive. At seventeen she was working in a cigar factory for \$7 a week, all of which she gave her good for nothing father for the support of the family. Through our recommendation the Schmidlapp Bureau offered her a scholarship for a course of training to fit her for

more congenial and suitable work, but, though she hated the cigar factory and her associates in it, she refused the scholarship. The Bureau felt that it was useless for her to try to go on with an education while living at home; her father was of course unwilling to have her leave home; and she had not the necessary ambition or independence to break away and force her father to shoulder his own responsibilities. Under those conditions we could do nothing for her.

The second girl on the list was perfectly content with the eight grades of a parochial school. She had looked into some high school books, and did not think them interesting, nor could she see that more of an education was essential for any calling which she wished to follow. She would not even consider a scholarship.

Meanwhile two girls from the public schools who stood lower in the tests, one of them much lower, started their careers as wage earners with a fixed ambition to have a high school education, and become teachers. Both of them have attended night high school steadily, and are to have scholarships from the Schmidlapp Bureau for higher courses of training as soon as they are graduated. The possession of ambition and of ideals will carry these two girls far beyond the two better endowed ones, whose outlook is different.

Not long ago two eighteen year old boys came to the office at the same time for fifth year tests. They were boys who both fell below 70 on the Yerkes scale. In our series they were both in the lowest ten-percentile. On both systems, then, they ranked as feeble-minded. One of them had the vacant smile which in itself was almost enough to brand him as lacking. He had left several places of employment because as he said, the boys picked on him and teased him. He was collarless and far from neat, though not dirty. His job was simple hand work in a factory, for which he received \$6 a week. The other boy might easily have been mistaken for a University student. His collar and tie were faultless, his suit neat, and he was reserved and self-respecting in manner. This boy had a job in routine machine work in a factory at which he was earning \$15 a week. While neither of these boys had the slightest prospect of succeeding at any calling higher than unskilled labor, within that limit

there was a vast difference in the outlook. One of them will doubtless be able to do routine machine operating acceptably, keep his positions, and earn steady wages between \$15 and \$20 a week. The other will probably always be a hanger-on, tolerated here and there at simple, poorly paid jobs; but it is very doubtful if he can ever earn a steady, living wage.

When our records are complete, we hope that we may be able to make some sort of a formulation as to how large a factor manner, appearance, in short, personality, is as compared with mental and physical endowment, home conditions, and the effect of industrial experiences which are at present accidentally determined.

Table of 10 Percentiles for Fourteen and Fifteen Year Old Working Children.

Percentiles and Limits	Height in Cms. ²				Weight in Kgs. ³				Vital Capacity in Ccs ⁴			
	Boys		Girls		Boys		Girls		Boys		Girls	
	14	15	14	15	14	15	14	15	14	15	14	15
Lower	131.0	135.0	137.2	142.0	26.1	29.45	29.5	34.9	1100	1325	900	1000
10	142.6	148.5	146.3	149.9	33.2	38.0	36.1	40.6	1804	1824	1493	1803
20	145.3	151.6	149.3	151.5	35.7	40.6	39.1	43.6	1984	2151	1743	1914
30	147.4	154.1	151.6	154.5	37.9	43.0	41.3	46.0	2106	2313	1894	2017
40	149.3	156.3	153.3	156.2	39.3	45.1	43.1	47.5	2206	2439	1983	2097
50	151.3	158.3	155.0	157.5	40.7	47.1	44.9	49.1	2305	2600	2074	2176
60	153.3	159.6	156.6	158.8	42.2	49.0	46.7	50.8	2404	2746	2171	2287
70	155.2	162.3	158.3	160.5	44.3	51.2	48.7	52.9	2539	2882	2273	2415
80	158.2	164.9	160.1	162.7	46.7	53.7	51.1	55.1	2715	3022	2393	2561
90	161.8	168.6	162.8	165.6	50.5	56.6	54.1	57.4	2935	3260	2586	2734
Upper	171.0	178.3	170.0	174.7	66.1	68.45	66.3	95.0	3600	4400	3125	3200

² Height—Taken clothed. Boys without coats.³ Weight—Measured in shoes. Heal measured and deducted.⁴ Vital Capacity—Wet Spirometer. Best of three trials.

Table of 10 Percentiles for Fourteen and Fifteen Year Old Working Children.

Percentiles and Limits	Grip, ⁵ Right Hand, in Kg.				Grip, Left Hand, in Kg.				Steadiness, ⁶ Right Hand in Hole and Contacts.			
	Boys		Girls		Boys		Girls		Boys		Girls	
	14	15	14	15	14	15	14	15	14	15	14	15
Lower	11.5	15.0	9.0	13.0	12.0	14.0	8.0	11.0	H.-C.	H.-C.	H.-C.	H.-C.
10	18.6	22.6	16.3	20.3	18.5	21.3	16.4	18.8	1-1	2-10	2-11	2-8
20	20.6	24.6	19.1	22.6	20.2	23.5	18.8	20.7	2-0	3-10	3-11	4-12
30	22.2	26.2	20.5	23.7	21.9	25.2	20.2	21.9	3-10	3-3	3-6	4-10
40	23.7	27.6	21.6	24.8	23.3	26.8	21.3	23.2	3-7	4-11	3-0	4-8
50	24.9	28.9	22.7	25.9	24.6	28.5	22.2	24.5	3-0	4-9	4-11	4-4
60	26.0	30.2	24.7	27.0	25.7	29.9	23.6	25.7	4-11	4-7	4-8	5-12
70	27.3	32.7	25.9	28.1	26.9	32.1	25.0	26.9	4-9	4-2	4-6	5-9
80	28.9	35.7	27.4	29.4	28.7	34.8	26.3	28.2	4-7	5-11	5-12	5-3
90	31.6	39.0	29.6	31.0	30.7	37.6	29.1	29.6	4-0	5-7	5-8	6-10
Upper	45.0	48.0	37.0	35.0	45.0	47.0	37.0	35.0	5-7	6-10	6-11	6-2
									7-7	7-6	8-10	8-9

⁵ Grip—Smedley Dynamometer. Best of three trials.⁶ Steadiness—Steadiness tester. Limit for each hole, 12 contacts in fifteen seconds.

Table of 10 Percentiles for Fourteen and Fifteen Year Old Working Children.

	Steadiness, Left Hand Hole and Contacts				Tapping, 30" Right Hand				Tapping 30" Left Hand			
Percentiles and Limits	Boys		Girls		Boys		Girls		Boys		Girls	
	14	15	14	15	14	15	14	15	14	15	14	15
Lower	H.-C.	H.-C.	H.-C.	H.-C.								
10	1-6	1-7	1-7	1-4	120	118	96	105	85	110	86	91
20	2-9	2-2	2-6	3-11	144	150	147	151	117	124	117	121
30	2-0	3-11	3-12	3-6	152	161	154	159	125	131	124	130
40	3-11	3-8	3-9	3-0	158	167	160	163	131	137	130	134
50	3-9	3-3	3-6	4-10	164	172	163	168	136	143	135	139
60	3-7	4-12	3-1	4-8	170	177	167	171	140	147	139	143
70	3-3	4-10	4-11	4-6	174	182	171	175	145	152	145	148
80	4-11	4-8	4-9	5-12	179	186	176	178	151	156	150	153
90	4-7	4-3	4-6	5-9	185	192	180	185	157	162	156	158
Upper	4-5	5-9	5-6	6-11	191	204	188	195	165	168	166	168
	7-10	7-9	7-10	8-12	226	300	225	234	206	212	198	201

⁷ Tapping—Tapping Board and Electric Enumerator. Arm resting on the board,—wrist movement.

Table of 10 Percentiles for Fourteen and Fifteen Year Old Working Children.

	Tapping one min. Right Hand				Tapping one min. Left Hand				Index of Fatigue ⁸ Right Hand			
Percentiles and Limits	Boys		Girls		Boys		Girls		Boys		Girls	
	14	15	14	15	14	15	14	15	14	15	14	15
Lower	219	204	216	201	179	203	167	175	37.8	42.7	38.9	35.8
10	273	287	280	285	223	228	222	231	26.4	25.9	25.7	23.3
20	290	303	291	301	235	248	238	246	23.5	22.3	22.0	20.7
30	303	314	301	309	246	260	247	256	20.7	20.2	19.8	18.9
40	312	324	308	317	256	268	255	264	18.6	18.4	18.2	17.4
50	321	334	315	325	266	276	263	272	16.9	16.6	16.5	16.0
60	330	344	323	332	275	285	273	280	15.4	14.9	14.9	14.5
70	339	353	333	339	285	294	281	290	13.7	13.3	13.5	12.8
80	350	364	344	351	296	304	294	300	11.9	11.3	10.5	10.7
90	364	379	357	367	313	318	311	315	8.9	7.9	8.4	7.7
Upper	443	571	430	440	391	402	372	372	neg. in.	neg. in.	neg. in.	neg. in.

⁸ Index of Fatigue—Per cent of loss of speed between first and last quarter minute.

Table of 10 Percentiles for Fourteen and Fifteen Year Old Working Children.

Percentiles and Limits.	Index of Fatigue Left Hand				Card Sorting, ⁹ Index in Seconds				Cancellation ¹⁰ Index			
	Boys		Girls		Boys		Girls		Boys		Girls	
	14	15	14	15	14	15	14	15	14	15	14	15
Lower	50.0	38.2	44.3	40.3	80.6	78.5	83.5	83.3	726.9	354.4	521.5	402.4
10	26.7	26.1	28.1	24.2	63.7	57.2	54.7	51.3	342.0	239.0	304.0	206.5
20	24.1	23.1	23.9	21.5	58.8	53.4	51.4	46.9	286.2	222.6	251.3	184.8
30	22.5	21.0	20.9	19.7	55.0	50.4	48.9	44.2	259.4	208.3	228.1	171.1
40	19.6	19.3	19.3	18.1	52.9	48.3	47.0	42.5	237.9	195.0	210.9	159.3
50	17.8	17.8	17.9	16.5	50.7	46.4	45.0	40.8	220.2	182.6	195.2	150.8
60	16.1	16.3	16.1	14.8	48.4	44.5	43.5	39.1	206.3	171.8	182.3	142.2
70	13.9	13.9	13.9	13.0	45.9	42.6	41.9	37.6	193.5	161.4	170.2	133.9
80	11.2	11.6	11.2	10.6	43.4	40.7	40.3	36.0	179.7	149.8	157.9	125.8
90	7.9	8.3	7.9	6.4	40.9	37.4	37.4	33.6	162.4	136.5	143.7	113.7
Upper	neg. in	neg. in	neg. in	neg. in	29.3	28.4	31.4	28.5	113.8	105.1	111.5	84.1

⁹ Card Sorting—Forty-eight cards, four colors. Sorted face up.¹⁰ Cancellation—Printed page of small letters. Letter a, 14 years; letter m, 15 years.

Table of 10 Percentiles for Fourteen and Fifteen Year Old Working Children.

Percentiles and Limits.	Cancellation Accuracy in %				Memory ¹¹ in % 7 Place Digits				Memory, 8 Place Digits			
	Boys		Girls		Boys		Girls		Boys		Girls	
	14	15	14	15	14	15	14	15	14	15	14	15
Lower	19.0	50.0	30.8	52.0	39.3	46.0	35.0	57.0	22.0	9.4	25.0	22.0
10	54.8	77.0	56.4	83.9	64.8	75.3	67.9	77.6	49.5	57.2	50.1	54.8
20	66.7	87.2	65.2	88.5	75.6	85.9	76.7	86.9	59.3	66.6	60.0	67.3
30	74.9	90.2	73.9	91.8	84.4	88.9	85.7	89.9	66.8	71.1	68.9	72.6
40	78.3	92.5	78.1	95.0	88.4	91.7	89.0	93.1	70.9	74.5	72.9	77.6
50	83.3	94.8	81.6	96.3	91.1	94.2	91.8	95.8	74.8	80.8	78.6	83.4
60	87.1	96.3	85.0	97.1	93.1	96.1	93.9	96.8	82.1	86.4	84.4	88.9
70	89.6	97.4	88.5	98.0	95.2	97.2	95.9	97.8	87.7	91.3	90.0	93.4
80	93.7	98.4	92.0	98.9	97.1	98.5	97.5	98.6	92.7	94.2	93.7	95.4
90	97.5	99.5	95.4	99.7	98.8	99.5	99.2	99.7	96.5	98.0	97.2	98.0
Upper	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

¹¹ Memory—Series of 7, 8, and 9 Place Digits. Average of two series of each length. Visual,—Auditory,—Motor Method with Metronome, one a second. No ranks of 10 were given in 7 place memory, because from 30 to 50 per cent of each group had perfect records. Ranks of 8 or 9 were used instead according to the size of the group of perfect records.

Table of 10 Percentiles for Fourteen and Fifteen Year Old Working Children.

Percentiles and Limits	Memory, 9 Place Digits				Substitution, ¹² Page 1, Index				Substitution, Page 2, Index			
	Boys		Girls		Boys		Girls		Boys		Girls	
	14	15	14	15	14	15	14	15	14	15	14	15
Lower	11.0	17.0	22.0	22.0	400.0	286.6	419.5	307.8	378.0	241.3	298.4	295.1
10	44.4	46.3	43.1	47.2	227.5	205.8	217.1	200.6	184.8	168.6	176.1	168.1
20	51.4	53.6	50.3	56.3	208.1	186.2	192.4	177.0	165.2	151.4	159.0	145.3
30	56.6	59.0	58.7	61.0	195.0	174.6	179.3	166.2	151.4	139.9	149.0	134.3
40	60.6	64.3	63.7	65.5	183.7	165.8	170.9	156.6	139.5	131.8	139.1	126.5
50	66.1	69.5	68.2	71.5	172.7	157.3	162.6	148.6	133.2	123.7	130.4	119.0
60	71.4	73.7	72.5	77.4	161.9	149.6	154.3	140.5	126.9	115.9	121.8	112.9
70	75.8	81.6	78.0	82.8	151.9	141.7	146.1	133.8	120.6	108.4	113.1	106.7
80	83.6	87.2	85.9	87.1	142.0	132.3	136.9	127.1	110.4	100.8	104.4	100.6
90	92.1	93.6	92.5	92.8	129.4	122.4	125.0	120.3	99.8	88.5	92.7	88.6
Upper	100	100	100	100	71.0	82.2	83.3	98.4	68.5	55.0	68.0	67.4

¹²Substitution—Nine geometrical forms to be associated with nine digits. Four pages of fifty forms each. Page 4 from memory.

Table of 10 Percentiles for Fourteen and Fifteen Year Old Working Children.

Percentiles and Limits	Substitution, Page 3, Index				Substitution, Page 4, Index				Sentences, ¹³ No. begun in 2"			
	Boys		Girls		Boys		Girls		Boys		Girls	
	14	15	14	15	14	15	14	15	14	15	14	15
Lower	276.4	355.5	242.9	248.6	1257.6	906.5	60000	19875	0.0	0.0	0.0	0.0
10	165.5	156.9	156.0	150.9	226.0	238.5	217.2	225.3	0.8	0.0	0.6	0.0
20	145.9	138.9	139.9	134.4	162.3	163.2	161.4	153.0	1.7	1.5	1.6	0.9
30	133.6	127.8	129.7	122.9	137.1	131.7	140.5	130.2	2.6	2.9	2.8	1.9
40	124.0	117.9	119.7	115.2	121.0	114.7	125.4	115.1	4.2	4.4	3.7	3.0
50	115.9	110.7	112.7	108.7	111.2	104.9	112.6	103.9	4.9	5.7	4.7	4.9
60	108.7	103.6	105.8	102.3	101.9	96.1	101.0	95.6	5.9	6.9	5.8	6.1
70	101.6	96.0	98.6	95.5	93.6	88.3	92.6	88.5	6.9	8.1	7.1	7.3
80	92.5	88.0	89.4	88.4	85.6	80.5	84.5	81.9	8.3	9.3	8.3	8.6
90	82.8	80.1	80.3	81.3	75.1	69.6	73.5	70.4	10.0	10.7	9.6	10.5
Upper	59.4	54.0	59.8	59.2	53.0	52.6	52.3	50.6	13.0	13.0	13.0	13.0

¹³ Sentences—Completion of 13 sentences.

Table of 10 Percentiles for Fourteen and Fifteen Year Old Working Children.

Percentiles and Limits	Sentences, No. of Ideas				Sentences, Index of Ideas ¹⁵				Sentences, No. Correct			
	Boys		Girls		Boys		Girls		Boys		Girls	
	14 ¹⁴	15	14	15	14	15	14	15	14	15	14	15
Lower	6.0	7.0	7.0	8.0	106.0	99.4	42.0	90.0				
10	12	14	12	14	20.5	20.2	18.0	19.4	8.8	10.3	8.9	9.4
20	13	16	13	17	16.2	15.4	14.9	15.9	9.8	11.4	10.0	11.1
30	14	18	15	19	13.9	12.8	13.2	12.4	10.6	12.1	10.7	12.1
40	15	20	16	21	12.4	11.7	11.9	10.9	11.3	12.6	11.4	12.4
50	17	22	17	23	11.1	10.5	10.7	10.2	11.9	13.0	12.1	12.8
60	18	24	19	25	10.0	9.6	9.7	9.4	12.4	13.2	12.4	13.1
70	20	26	20	26	9.2	8.8	8.8	8.5	12.8	13.4	12.8	13.3
80	23	28	23	28	8.4	7.5	7.9	7.6	13.2	13.6	13.1	13.6
90	25	32	26	32	7.2	6.8	7.0	6.7	13.6	13.8	13.6	13.9
Upper	59.0	59	39	46	4.7	4.3	4.9	4.2				

¹⁴ One complete failure.¹⁵ Number of seconds per idea expressed.

Table of 10 Percentiles for Fourteen and Fifteen Year Old Working Children.

	Opposites ¹⁶		Accuracy in %		Puzzle Box ¹⁸		Time in sec.	
	Boys		Girls		Boys		Girls	
	14	15	14	15	15		15	
Lower	15.0	17.0 ¹⁷	20.0	7.5	Failure		Failure	
10	49.4	56.6	57.8	56.5	720	Failure	720	Failure
20	59.7	64.9	67.7	67.9	634		720	Failure
30	68.8	69.9	72.1	73.2	465		720	Failure
40	73.6	73.9	75.4	76.7	365		712	
50	78.4	77.3	79.6	80.0	304		602	
60	82.3	80.5	84.2	83.9	261		470	
70	85.4	83.9	87.6	87.4	220		386	
80	89.4	87.6	90.4	90.4	175		298	
90	93.5	92.2	94.1	93.9	126		227	
Upper	100	100	100	100	45		95	

¹⁶ Opposites—List of twenty words. Harder lists used at fifteen than at fourteen years.¹⁷ One complete failure.¹⁸ Puzzle Box—Healy and Fernald Box. Painted black inside. Recorded no. of seconds required to open box. 720 failure.

Averages of Percentile Ranks in Physical Tests. 14 Year Old Working Children.

PUBLIC SCHOOL.

Grade	Boys							Girls						
	V	VI	VII	VIII	IX	VIII and IX		V	VI	VII	VIII	IX	VIII and IX	
Average	No.	%	No.	%	No.	%	No.	No.	%	No.	%	No.	%	No.
11-15	0		0		0		0		0		0		0	
16-20	0		0		0		0		0		0		0	
21-25	1	1.1	1	1.4	0		0		0		0		0	
26-30	3	3.2	2	2.7	1	2.2	0	1	2.3	1	1.7	2	4.6	0
31-35	11	11.8	2	2.7	0		1	1	7.7	2	4.6	2	4.6	1
36-40	6	6.4	6	8.2	1	2.2	1	3.8	3	7.0	7	11.7	1	2.3
41-45	6	6.4	6	8.2	3	6.5	3	11.5	5	11.6	3	5.0	4	9.3
46-50	12	12.9	7	9.6	8	17.4	0		9	20.9	8	13.3	6	13.9
51-55	13	14.0	10	13.7	7	15.2	1	3.8	2	4.6	8	13.3	5	11.6
56-60	13	14.0	9	12.3	2	4.3	3	11.5	7	16.3	10	16.7	3	7.0
61-65	9	9.7	11	15.1	8	17.4	4	15.4	4	9.3	7	11.7	6	13.9
66-70	6	6.4	7	9.6	3	6.5	4	15.4	2	4.6	2	3.3	4	9.3
71-75	4	4.3	4	5.5	6	13.0	2	7.7	5	11.6	5	8.3	4	9.3
76-80	3	3.2	5	6.8	4	8.7	2	11.5	2	4.6	3	5.0	5	11.6
81-85	4	4.3	2	2.7	1	2.2	1	3.8	1	2.3	3	5.0	1	2.3
86-90	2	2.1	1	1.4	2	4.3	2	7.7	0		1	1.7	0	
91-95	0		0		0		0		0		0		0	
Totals	93		73		46		24	2	43		60		43	3

PAROCHIAL SCHOOL.

11-15	0		0		0			1	3.8		0		0	
16-20	1	2.6	0		0			0			1	1.8	0	
21-25	0		1	1.7	0			0		3	6.7	2	3.6	1
26-30	2	5.2	1	1.7	1	1.5	1	2.4	0	3	6.7	0		0
31-35	2	5.2	3	5.0	6	9.2	2	4.9	3	11.5	3	6.7	2	3.6
36-40	4	10.5	4	6.7	2	3.1	4	9.8	1	3.8	3	6.7	4	7.1
41-45	7	18.4	9	15.0	8	12.3	1	2.4	4	15.4	5	11.1	7	12.5
46-50	5	13.2	11	18.3	10	15.4	4	9.8	3	11.5	6	13.3	7	12.5
51-55	3	7.9	9	15.0	11	16.9	8	19.5	4	15.4	7	15.5	8	14.3
56-60	6	15.8	5	8.3	5	7.7	7	17.0	4	15.4	7	15.5	7	12.5
61-65	4	10.5	7	11.7	7	10.8	2	1	7.3	0	0.0	3	6.7	6
66-70	2	5.2	5	8.3	8	12.3	4	9.8	3	11.5	2	4.4	8	14.3
71-75	2	5.2	4	6.7	4	6.1	1	1	4.9	1	3.8	2	4.4	3
76-80	0		0		2	3.1	1	2.4	2	7.7	0		1	1.8
81-85	0		1	1.7	0		2	4.9	0		1	2.2	0	
86-90	0		0		0		1	2.4	0		0		0	
91-95	0		0		1	1.5	0	1	2.4	0		0	0	
Totals	38		60		65		38	3	26		45		56	3

Averages of Percentile Ranks in Physical Tests. 15 Year Old Working Children.

PUBLIC SCHOOL.

	Boys									Girls										
Grade	V		VI		VII		VIII		XI	VIII and IX	V		VI		VII		VIII		IX	VIII and IX
Averages	No.	%	No.	%	No.	%	No.	No.	%		No.	%	No.	%	No.	%	No.	No.	%	
11-15	0		0		0		0				0						0			
16-20	0		0		0		0				0		1	1.9			0			
21-25	0		0		0		0				0		0				0			
26-30	2	2.5	2	3.2	0		0				1	2.8	0		2	5.6	0			
31-35	8	10.0	4	6.5	4	9.3	0				0		3	5.7	4	11.1	2			9.5
36-40	8	10.0	2	3.2	1	2.3	1		4.2		0		4	7.5	2	5.6	1			4.7
41-45	9	11.2	3	4.8	2	4.6	3		12.5		5	13.9	4	7.5	2	5.6	1			4.7
46-50	6	7.5	11	17.8	5	11.7	1		4.2		10	27.8	6	11.4	2	5.6	0	1		4.7
51-55	12	15.0	8	12.8	6	14.0	4	1	20.8		3	8.4	7		3	8.3	3			14.3
56-60	10	12.5	11	17.8	3	7.0	4		16.7		2	5.5	9		4	11.1	0			
61-65	10	12.5	8	12.8	6	14.0	0				7	19.5	11	20.8	4	11.1	5			23.9
66-70	5	6.2	5	8.3	4	9.3	5		20.8		4	11.1	5	9.4	7	19.5	1			4.7
71-75	5	6.2	3	4.8	5	11.7	2		8.3		2	5.5	2	3.8	3	8.3	2			9.5
76-80	2	2.5	4	6.5	2	4.6	0				2	5.5	1	1.9	2	5.6	2			9.5
81-85	2	2.5	1	1.6	3	7.0	1	1	8.3		0		0		1	2.8	3			14.3
86-90	1	1.3	0		0		0				0		0		0		0			
91-95	0		0		2	4.6	1		4.2		0		0		0		0			
Totals	80		62		43		22	2			36		53		36		20	1		

PAROCHIAL SCHOOL.

11-15	0		1	1.9			0			1	4.2	0		0		0		
16-20	0		1	1.9			0			0		1	2.7	0		0		
21-25	0		0				1		3.0	0		0		2	3.9	0		
26-30	0		1	1.9	1	1.6	0			3	12.5	0		0		0		
31-35	2	5.7	4	7.6	5	8.0	1		3.0	0		6	16.2	1	2.0	2		6.9
36-40	4	11.4	6	11.6	4	6.5	4		12.1	2	8.3	0		4	7.8	1		3.4
41-45	5	14.3	3	5.7	7	11.3	3		9.1	1	4.2	7	18.9	7	13.7	1		3.4
46-50	3	8.6	12	23.1	8	12.9	3		9.1	6	25.0	6	16.2	8	15.7	3	2	17.3
51-55	5	14.3	4	7.6	6	9.7	4		12.1	2	8.3	2	5.4	10	19.6	6		20.7
56-60	7	20.0	4	7.6	13	20.9	4		12.1	5	20.9	3	8.1	2	3.9	6		20.7
61-65	4	11.4	8	15.4	6	9.7	1		3.0	1	4.2	6	16.2	4	7.7	2		6.9
66-70	2	5.7	2	3.8	5	8.0	4		12.1	1	4.2	3	8.1	6	11.9	3	1	13.8
71-75	2	5.7	2	3.8	2	3.2	4		12.1	1	4.2	3	8.1	4	7.7	2		6.9
76-80	1	2.9	2	3.8	4	6.5	2		6.1	0		0		2	3.9	0		
81-85	0		2	3.8	0		2		6.1	0		0		0		0		
86-90	0		0		1	1.6	0			0		0		1	2.0	0		
91-95	0		0		0		0			1	4.2	0		0		0		
Totals	35		52		62		33			24		37		51		26	3	

Averages of Percentile Ranks in Mental Tests. 14 Year Old Working Children.

PUBLIC SCHOOL.

	Boys									Girls								
Grade	V		VI		VII		VIII		VIII and IX	V	VI		VII		VIII		IX	VIII and IX
Average	No.	%	No.	%	No.	%	No.	No.	%	No.	%	No.	%	No.	%	No.	No.	%
11-15	1	1.1	0		0			0		0		0					0	
16-20	2	2.1	0		0		0			2	4.6	0		0			0	
21-25	0		1	1.4	0		0			3	7.0	0		0			0	
26-30	5	5.4	0		0		0			1	2.3	3	5.0	1	2.4		0	
31-35	7	7.5	3	4.1	0		2		7.7	1	2.3	5	8.3	1	2.4		0	
36-40	15	16.1	4	5.5	1	2.2	0			8	18.6	3	5.0	4	9.5		0	
41-45	17	18.3	7	9.6	2	4.3	0			5	11.6	9	15.0	4	9.5		0	
46-50	12	12.9	9	12.3	1	2.2	1		3.8	7	16.3	4	6.7	5	11.9	1	1	7.7
51-55	12	12.9	8	11.0	3	6.5	0			6	14.0	7	11.7	7	16.7	3		11.5
56-60	11	11.8	14	19.2	11	23.9	2	1	11.5	6	14.0	13	21.7	4	9.5	3		11.5
61-65	4	4.3	15	20.5	6	13.0	4	1	19.2	1	2.3	10	16.7	5	11.9	2	1	11.5
66-70	3	3.2	3	4.1	7	15.2	4		15.4	1	2.3	1	1.7	4	9.5	3		11.5
71-75	1	1.1	4	5.5	8	17.4	5		19.2	1	2.3	2	3.3	4	9.5	4		15.4
76-80	3	3.2	4	5.5	5	10.9	0			0		3	5.0	2	4.8	5		19.2
81-85	0		1	1.4	2	4.3	4		15.4	1	2.3	0		1	2.4	1		3.8
86-90	0		0				2		7.7	0		0		0		2		7.7
91-95	0				0		0			0		0		0		0		
Totals	93		73		46		24	2		43		60		42		24	2	

PAROCHIAL SCHOOL.

11-15	0	0	0	0		0	1	2.2	0	0		
16-20	1	2.6	0	0	0	1	3.8	1	2.2	1	1.8	0
21-25	3	7.9	1	1.7	0	1	3.8	1	2.2	1	1.8	0
26-30	3	7.9	5	8.3	2	3.1	0	1	3.8	3	6.7	0
31-35	7	18.4	2	3.3	2	3.1	2	4.9	4	15.4	3	6.7
36-40	8	21.0	7	11.7	3	4.6	0	5	19.2	6	13.3	1
41-45	5	13.2	9	15.0	5	7.7	1	2.4	4	15.4	4	8.9
46-50	1	2.6	6	10.0	3	4.6	2	4.9	2	7.7	4	8.9
51-55	3	7.9	6	10.0	17	26.1	5	12.2	5	19.2	6	13.3
56-60	5	13.2	8	13.3	7	10.8	5	12.2	0	4	8.9	9
61-65	0	0	5	8.3	6	9.2	7	1	19.5	1	3.8	6
66-70	2	5.3	7	11.7	5	7.7	3	7.3	2	7.7	0	7
71-75	0	1	1.7	3	4.6	5	1	14.6	0	2	4.4	8
76-80	0	1	1.7	1	1.5	2	1	7.3	0	1	2.2	5
81-85	0	1	1.7	7	10.8	3	7	3	0	3	6.7	2
86-90	0	1	1.7	3	4.6	3	7	3	0	0	1	1
91-95	0	0	1	1.5	0	0	0	0	0	0	0	0
Totals	38		60		65		38	3	26		45	

Averages of Percentile Ranks in Mental Tests. 15 Year Old Working Children.

PUBLIC SCHOOLS.

Grade	Boys							Girls						
	V	VI	VII	VIII	IX	VIII and IX		V	VI	VII	VIII	IX	VIII and IX	
Averages	No.	%	No.	%	No.	%	No.	No.	%	No.	%	No.	%	No.
11-15	0		0		0			0		0		0		
16-20	0		0		0			0		0		0		
21-25	0		0		0			1 2.8	1 1.9	0		0		
26-30	3 3.7	1 1.6	0		0			1 2.8	1 1.9	0		0		
31-35	10 12.5	3 4.8	0		0			8 22.2	3 5.7	1 2.8		0		
36-40	12 15.0	5 8.1	1 2.3		1	4.2		2 5.5	3 5.7	3 8.3		0		
41-45	11 13.7	8 12.9	2 4.6		0			3 8.3	8 15.1	2 5.5		0		
46-50	12 15.0	5 8.1	1 2.3		0			4 11.1	6 11.3	5 13.9		0		
51-55	6 7.5	8 12.9	7 16.3		4	16.7		6 16.7	9 17.0	6 16.7		0		
56-60	15 18.7	11 17.7	12 27.9		5	20.8		3 8.3	7 13.2	4 11.1		3		14.3
61-65	3 3.7	8 12.9	8 18.6		2	8.3		3 8.3	8 15.1	0		4		19.0
66-70	3 3.7	4 6.4	6 13.9		2	12.5	1	3 8.3	6 11.3	10 27.8		4	1	23.8
71-75	3 3.7	5 8.1	5 11.6		4	16.7		1 2.8	0	5 13.9		4		19.0
76-80	2 2.5	4 6.4	0		2	12.5	1	1 2.8	1 1.9	0		5		23.8
81-85	0	0	0		1	4.2		0	0	0		0		
86-90	0	0	1 2.3		1	4.2		0	0	0		0		
91-95	0	0	0		0			0	0	0		0		
Totals	80		62		43		22	2		36		53		36

PAROCHIAL SCHOOLS.

11-15	0	0	0	0	0		0	1 2.7	0	0				
16-20	2 5.7	0	0	0	0		0	1 2.7	0	0				
21-25	1 2.8	0	0	0	0		1 4.2	0	0	0				
26-30	0	0	0	0	0		1 4.2	1 2.7	2 3.9	1				3.6
31-35	4 11.4	6 11.3	2 3.2	1	3.1	3.1	3 12.5	6 16.2	2 3.9	0				
36-40	9 25.7	4 7.5	5 8.1	1	3.1	3.1	1 4.2	4 10.8	2 3.9	2				7.1
41-45	7 20.0	5 9.4	5 8.1	2	6.3	6.3	6 25.0	3 8.1	2 3.9	1				3.6
46-50	3 8.6	10 18.9	7 11.3	1	3.1	3.1	2 8.3	4 10.8	6 11.7	0				
51-55	3 8.6	10 18.9	11 17.7	5	15.6	15.6	1 4.2	7 18.9	11 21.6	4				14.3
56-60	2 5.7	4 7.5	12 19.3	8	25.0	25.0	2 8.3	5 13.5	7 13.7	0				
61-65	2 5.7	8 15.1	8 12.9	2	6.3	6.3	5 20.8	1 2.7	5 9.8	6				21.4
66-70	2 5.7	5 9.4	2 3.2	3	9.4	9.4	1 4.2	2 5.4	3 5.9	4	1			17.9
71-75	0	1 1.9	3 4.8	6	18.7	18.7	1 4.2	2 5.4	6 11.7	4				14.3
76-80	0	0	5 8.1	1	3.1	3.1	0	0	1 2.0	2	1			10.7
81-85	0	0	2 3.2	1	3.1	3.1	0	0	4 7.8	1	1			7.1
86-90	0	0	0	1	3.1	3.1	0	0	0	0				
91-95	0	0	0	0	0		0	0	0	0				
Totals	35		53		62		32		24		37		51	

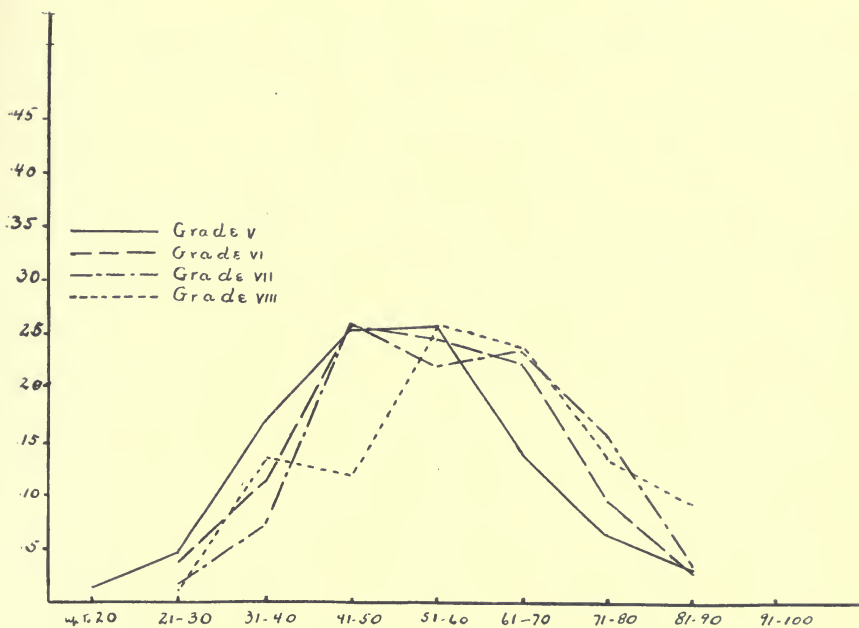
*One omitted. Tests incomplete.

Distribution of Average Percentile Ranks.

Age	Physical Tests				Mental Tests			
	Boys		Girls		Boys		Girls	
	14	15	14	15	14	15	14	15
11-15	0	1	1	1	1	0	1	1
16-20	1	1	1	2	3	2	5	1
21-25	3	1	6	2	5	1	6	3
26-30	11	6	7	6	15	4	9	7
31-35	28	28	16	18	25	26	15	23
36-40	28	30	21	14	38	38	27	17
41-45	43	35	33	28	46	40	32	25
46-50	57	49	47	44	35	39	26	27
51-55	62	50	43	36	54	54	44	44
56-60	50	56	44	31	64	69	46	31
61-65	53	43	35	40	49	41	36	32
66-70	39	32	26	31	34	28	25	35
71-75	28	25	26	19	28	27	28	23
76-80	18	17	17	9	17	15	21	11
81-85	11	12	10	4	18	4	8	6
86-90	8	2	2	1	9	3	4	0
91-95	2	3	0	1	1	0	0	0
Total No. Cases	442	391	335	287	442	391	333	286

Percentile Table of Average Percentile Ranks.

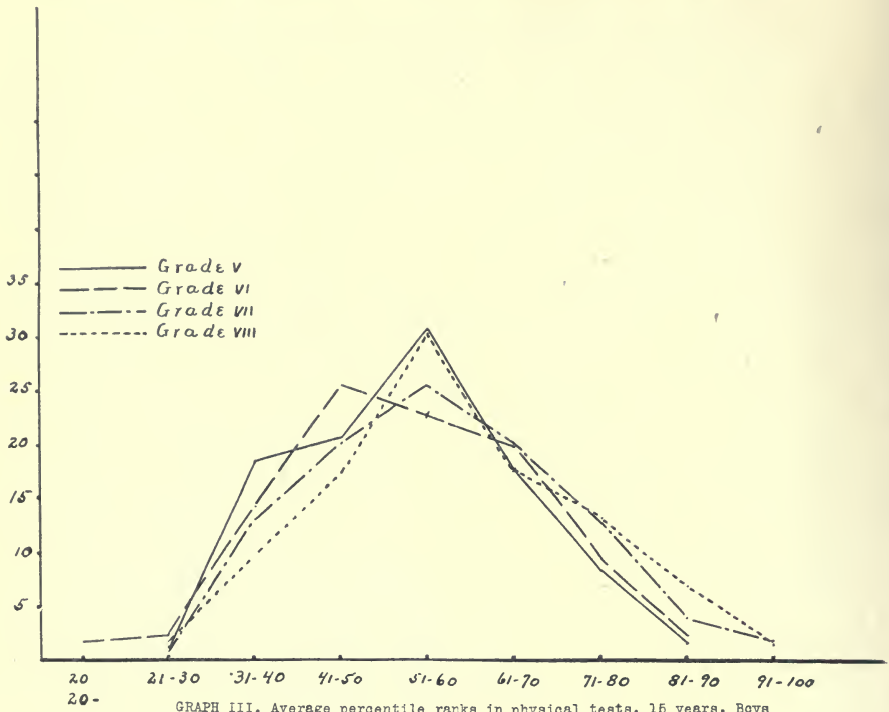
	Physical Tests				Mental Tests			
	Boys		Girls		Boys		Girls	
	14	15	14	15	14	15	14	15
Lower Limit	19.0	14.0	13.0	10.0	15.0	17.0	15.0	11.0
5	31.3	31.9	30.5	30.9	29.3	32.4	27.6	30.5
10	37.2	38.3	35.6	34.9	34.0	36.8	34.1	33.6
20	42.0	41.6	42.3	42.6	40.1	40.9	40.6	41.0
30	46.6	46.6	46.6	46.7	45.0	45.8	45.9	46.6
40	50.5	50.5	50.2	50.0	50.8	50.6	51.4	51.2
50	54.0	54.4	54.1	54.0	54.9	54.2	55.2	54.4
60	58.3	58.0	58.0	58.4	58.4	57.2	58.8	58.8
70	62.5	61.9	62.2	62.4	62.4	60.1	63.1	63.3
80	67.3	66.5	67.7	66.2	69.2	64.8	68.9	67.8
90	74.1	74.0	74.1	71.4	75.2	71.8	74.9	72.5
95	79.7	79.2	78.6	75.4	81.6	75.8	78.9	76.2
Upper Limit	94.0	92.0	88.0	92.0	93.0	89.0	88.0	85.0

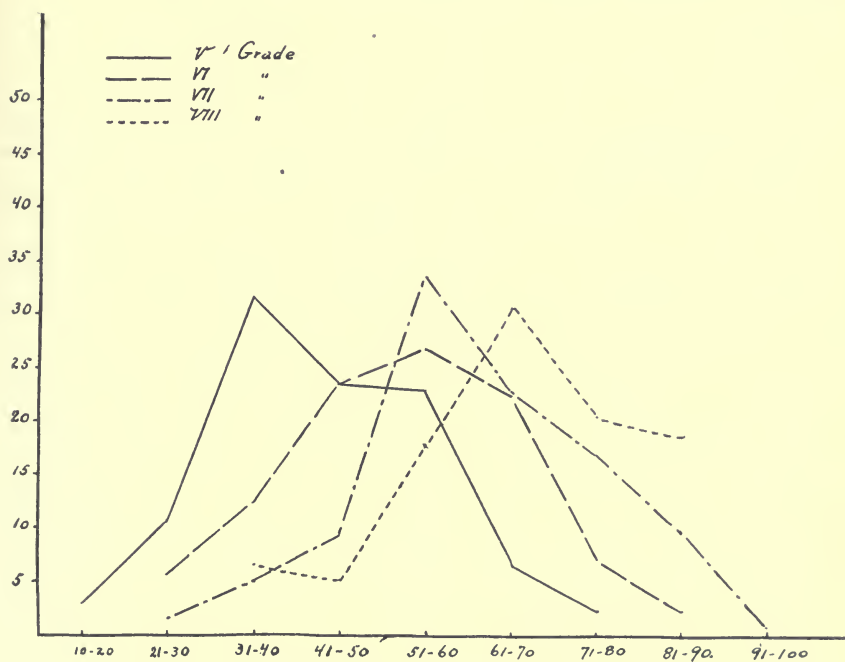


GRAPH I. Average percentile ranks in physical tests, 14 years. Boys.

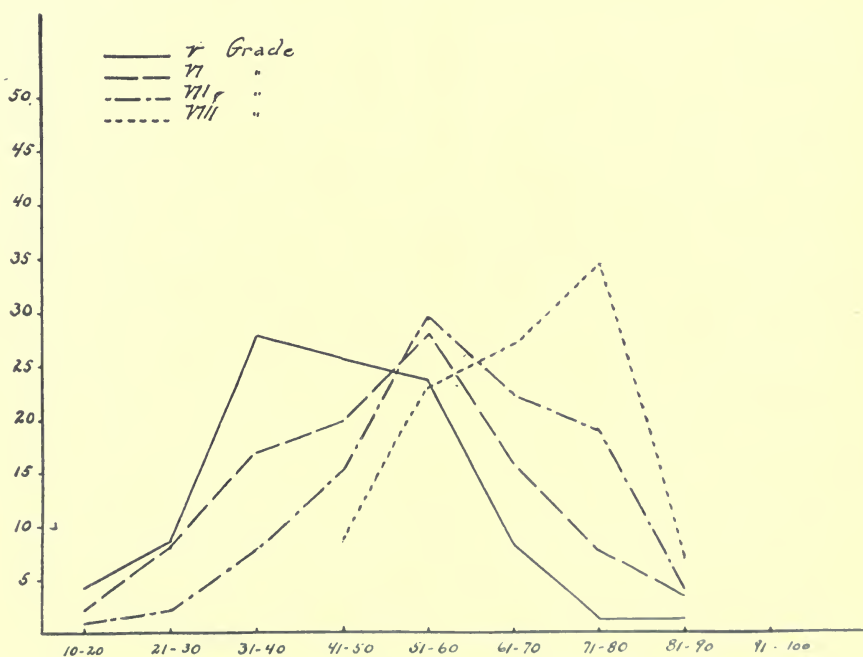


GRAPH II. Average percentile ranks in physical tests, 14 years. Girls.

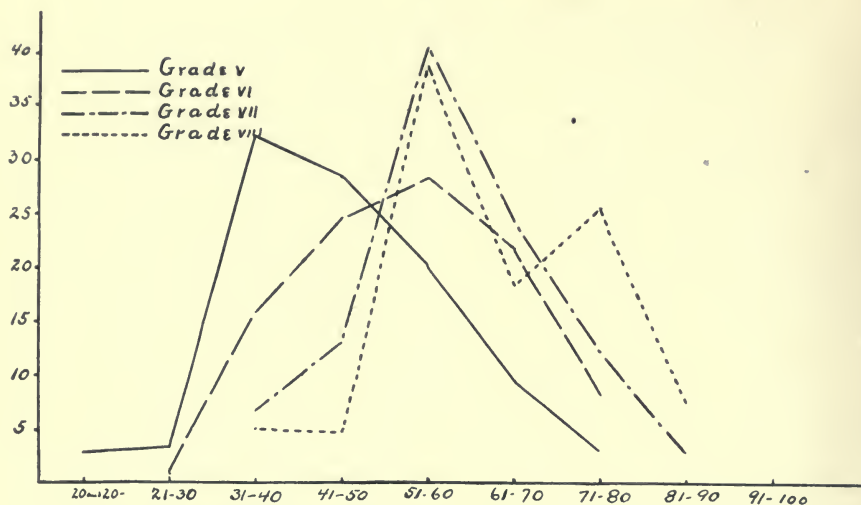




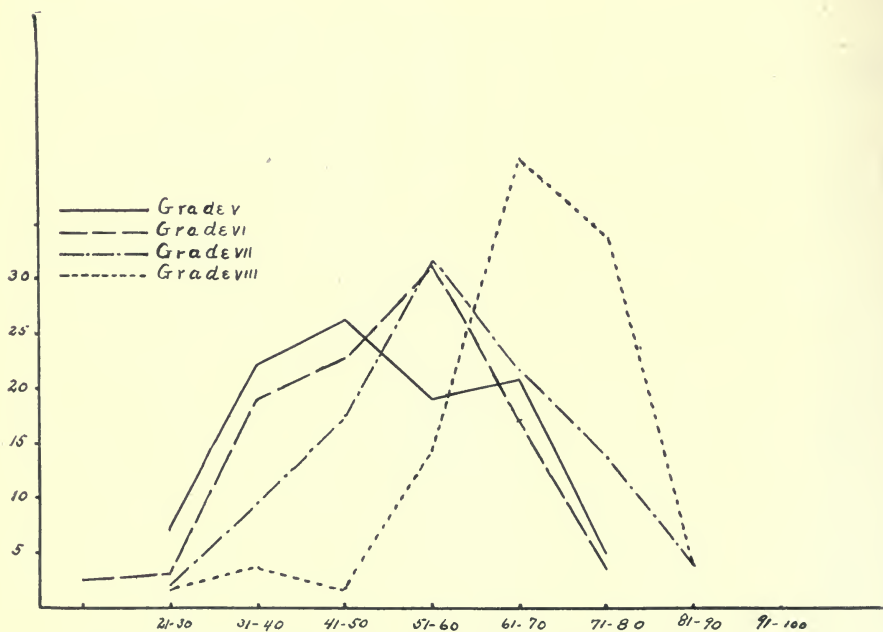
GRAPH V. Average percentile ranks in mental tests, 14 years. Boys.



GRAPH VI. Average percentile ranks in mental tests, 14 years. Girls.



GRAPH VII. Average percentile ranks in mental tests. 15 years. Boys.



GRAPH VIII. Average percentile ranks in mental tests. 16 years. Girls.

THE STANFORD REVISION OF THE BINET-SIMON SCALE AND SOME RESULTS FROM ITS APPLI- CATION TO 1000 NON-SELECTED CHILDREN

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ORDAHL, NEVA GALBREATH, AND WILFORD TALBERT¹

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SOURCES OF DATA FOR THE REVISION

The purpose of this article is to summarize briefly an investigation undertaken for the improvement of the Binet scale, and to suggest some possible contributions of intelligence testing to the psychology of mental development.

The work has extended over a period of five years and has involved the examination of 1700 normal children, 200 defective and superior children, and more than 400 adults. The present discussion will confine itself, however, to an account of tests carried out with 1000 non-selected children.

Tests of 400 children had been made by Childs and Terman in 1910-1911, and of 300 children by Trost, Waddle and Terman in 1911-12. For various reasons, however, the results of these tests did not furnish satisfactory data for a thoroughgoing revision of the scale. Accordingly a new investigation was undertaken, somewhat more extensive than the others and more carefully planned. Its main features may be described as follows:

1. We assembled as nearly as possible all the results which had been secured for each test of the scale by all the workers of all countries. The result was a large sheet of tabulated data for each individual test, including per cents passing the test at various ages, conditions under which the results were secured, method of procedure, etc. After a comparative study of these data, and in the light of results we had ourselves secured, a provisional arrangement of the tests was prepared for try-out.

¹ The tests of 1000 children were made by Miss Lyman, Dr. and Mrs. Ordahl, Miss Galbreath and Mr. Talbert. Terman is responsible for the test series and for the analysis of results. The Stanford Revision will appear shortly as a joint monograph.

2. A plan was then devised for securing subjects who should be as nearly as possible representative of the several ages. The method was to select a school in a community of average social status, a school attended by all or practically all the children in the district where it was located. In order to get clear pictures of age differences the tests were confined to children who were within two months of a birthday. To avoid accidental selection, *all* the children of even-age were tested in whatever grade enrolled. Tests of foreign-born children, however, were eliminated in the treatment of results. There remained tests of approximately 1000 children, of whom 905 were between 5 and 14 years of age.

3. The children's responses were recorded verbatim. This made it possible to re-score the records according to any desired standard and thus to fit a test more perfectly to the age level assigned it.

4. Much attention was given to securing uniformity of procedure. A half year was devoted to training the examiners and another half year to the supervision of the testing. In the further interests of uniformity all the records were scored by one person (Terman).

In working out a revision of the scale based upon these data the guiding principle was to secure an arrangement of the tests and a standard of scoring which would cause the median mental age of the children of each age group to coincide with the median chronological age. If the median mental age at any point in the scale was too high or too low it was only necessary to change the location of certain of the tests, or to change the standard of scoring, until an order of arrangement and a standard of passing were found which would throw the median mental age where it belonged. We had already become convinced, for reasons too involved for presentation here, that no satisfactory revision of the Binet scale was possible on any theoretical considerations as to the per cent. of passes which an individual test ought to show in a given year in order to be considered standard for that year. Such a plan would doubtless be feasible or even preferable with a scale differently founded, but not with that of Binet.

As was to be expected, the first draft of the revision did not prove satisfactory. The scale was still too hard at some points and too easy at others. In fact, three successive revisions were

necessary, involving three separate scorings of the data and as many tabulations of the mental ages, before the desired degree of accuracy was secured.

As finally left, the scale gives a median intelligent quotient closely approximating 100 for our non-selected children of each age from 4 to 14. The revision contains six regular tests and from one to three alternate tests in each year from 3 to 10, eight tests at year 12, six at 14, and six in each of two higher groups which are named, in order, "average adult" and "superior adult."

The tests in the two highest groups were standardized chiefly on the basis of results from 400 adults.² The extension of the scale in the upper range is such that ordinarily intelligent adults, little educated, test up to what is called the "average adult" level. Adults whose intelligence is known from other sources to be superior are found to test well up toward the "superior adult" level, and this holds true whether the subjects in question are well educated or practically unschooled.

Enough new tests were included in the trial series to permit the elimination of tests which failed to meet the requirements and still to give the revision some 27 tests more than were in the original scale.

The following method was employed for determining the validity of a test. The children of each age level were divided into three groups according to intelligence quotient, those testing below 90, those between 90 and 109, and those with an intelligence quotient of 110 or above. The percents of passes on each individual test at or near that age level were then ascertained separately for these three groups. If a test fails to show a decidedly higher proportion of passes in the superior I Q group than in the inferior I Q group, it can not be regarded a satisfactory test of intelligence. On the other hand, a test which satisfies this criterion must be accepted as valid or the entire scale must be rejected. Henceforth it stands or falls with the scale as a whole.

When tried out by this method, some of the tests which have been most criticized showed a high degree of reliability; others

² Including 30 business men tested by H. E. Knollin and Richard Zeidler, 40 high school students tested by Terman, 150 "migrating unemployed" tested by H. E. Knollin, and 150 delinquents tested by Mr. J. H. Williams.

which have been most praised proved to be so little correlated with intelligence that they had to be discarded.

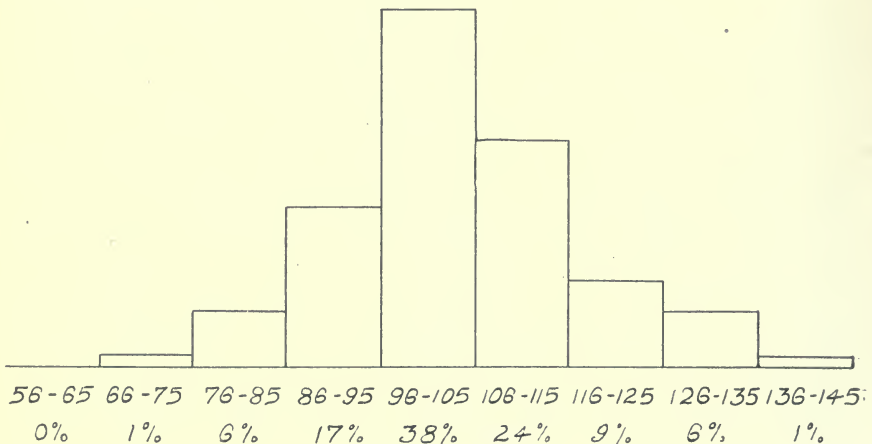
Next a brief summary of some results from the analysis of the data.

THE DISTRIBUTION OF INTELLIGENCE

Because of failure to avoid the influence of accidental selection in choosing subjects for testing, most of the Binet studies have thrown little light on the distribution of intelligence. The method of securing subjects for the present study makes our results on this point especially interesting.

The intelligence quotients were calculated for the 1000 children and their distribution was plotted for the ages separately. The distribution was found fairly symmetrical at each age from 5 to 14. At 15 the range is on either side of 90 as a median, and at 16 on either side of 80 as a median, which is of course due to the fact that these left-over retardates are usually below normal in intelligence.

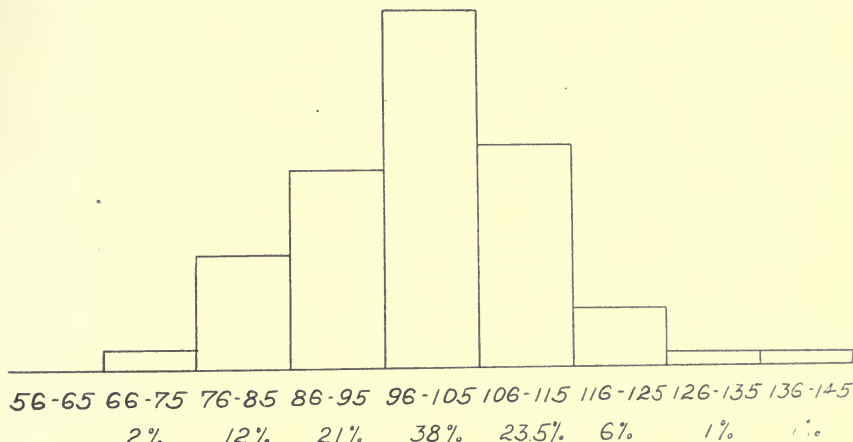
The I Q's were then grouped in ranges of ten. In the middle-group were thrown those from 96-105; the ascending groups including in order the I Q's from 106-115, 116-125, etc. Correspondingly with the descending groups. Graphs 1-3 show the results of this grouping for the ages 6, 9, and 13 separately. Graph 4 shows the distribution for the ages 5-14 combined. Graph 5 shows also the distribution for all ages combined, but this time with the I Q's grouped by ranges of 20 points instead of 10 (50-70, 71-90, 91-110, 111-130, 131-150).



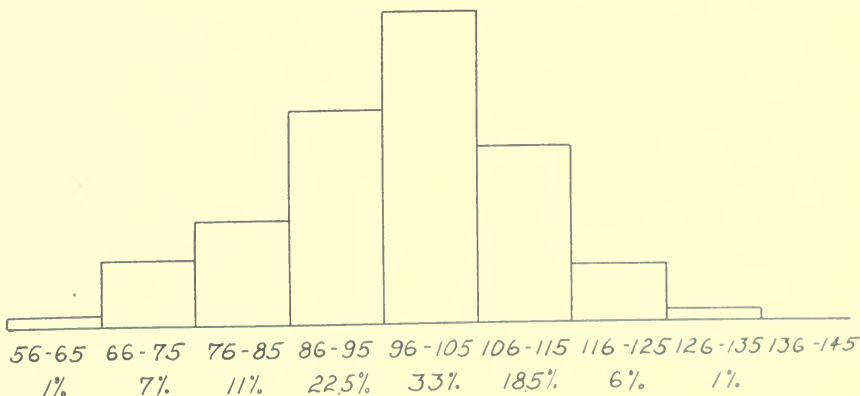
GRAPH 1. Showing distribution of I Q's of 117 non-selected 6-year-olds.

The distributions for the ages combined are seen to be remarkably symmetrical. The symmetry for the separate ages is hardly less marked, considering the fact that only 80-120 children were tested at each age. In fact, the range including the middle 50% of I Q's remains practically constant from 5 to 14 years.

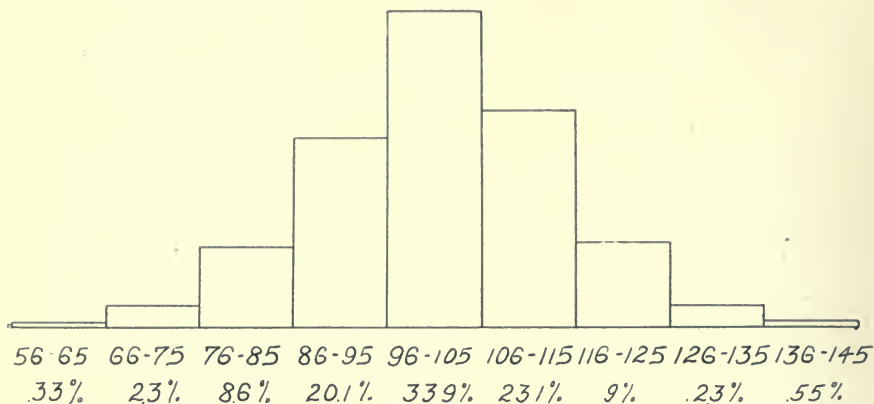
The traditional view that variability in mental traits greatly increases at or near the onset of adolescence is here contradicted as far as intelligence is concerned. Likewise the common opinion that deviations below normal are more frequent and more extensive than deviations above normal. It is found, for example, that for the ages 5-14 combined:



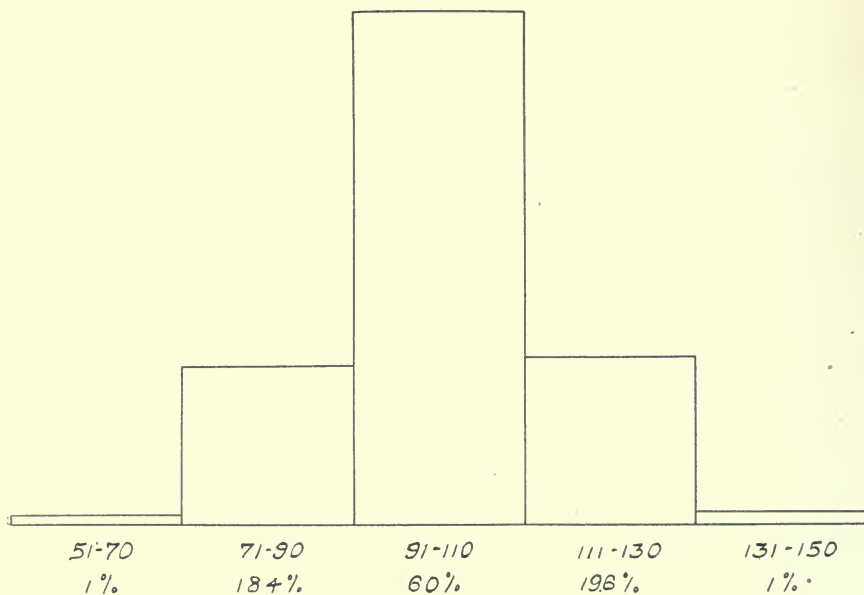
GRAPH 2. Showing distribution of I Q's of 113 non-selected 9-year-olds.



GRAPH 3. Showing distribution of I Q's of 98 non-selected 17-year-olds.



GRAPH 4. Showing distribution of I Q's of 905 non-selected children, ages 5--14 combined.



GRAPH 5. Showing distribution of I Q's of 905 non-selected children ages 5 -- 14 combined.

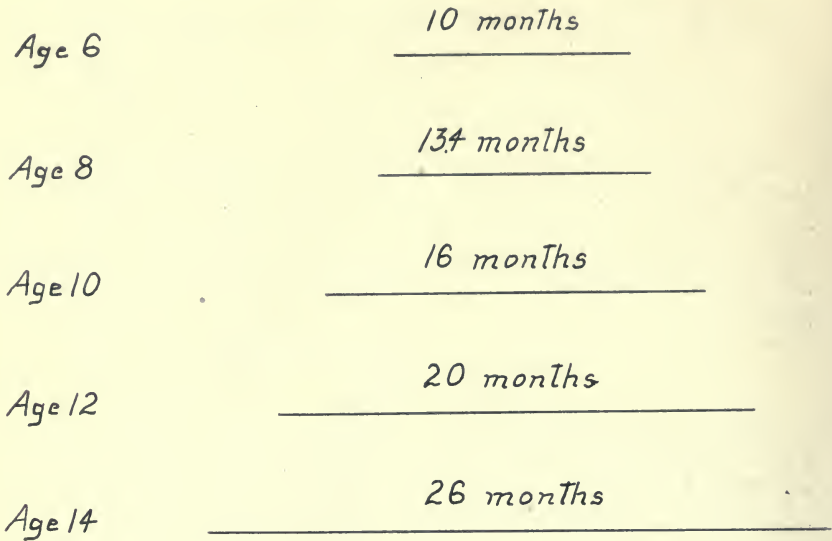
the lowest	1%	go to 70 or below;	the highest	1%	to 130 or above
" "	3%	" " 76 " " " "	" "	3%	" 125 " "
" "	10%	" " 85 " " " "	" "	10%	" 116 " "
" "	20%	" " 91 " " " "	" "	20%	" 110 " "

The nature of the distribution of I Q's emphasizes the hopelessness of our ever arriving at any universally acceptable definition of feeble-mindedness. The dividing line can be only arbitrary, exactly as would be the case if we attempted to classify all men into the two groups: "normally tall" and "abnormally short."

THE VALIDITY OF THE I Q

Since the distribution of I Q's remains practically constant at all ages from 5-14, it is evident that the usual method of expressing intelligence status in terms of years of retardation or acceleration is misleading. "A year of retardation" is a unit which has no constant value. A year of deviation at age 6 is exactly equivalent to a deviation of 18 months at age 9, and to 2 years at age 12, etc. This follows necessarily from the uniform nature of the distribution of I Q's in the different ages. The number of 6 year old children testing "at age" is approximately twice as great as the number of 12 year olds testing at age, and 50% greater than in the case of the 9 year olds. The range of months including the middle 50% of the mental ages increases at a fairly constant ratio from 6 to 14, as shown in Graph 6. These facts argue strongly in favor of the validity of the I Q as a means of method of expressing intelligence status.

The crucial experiment, of course, would be to test the same children several times during the period of mental growth in order to find whether the I Q remains constant. Unfortunately, the repeated tests which others have made for this purpose have involved the use of a very imperfect scale, the worst feature of which is that its inaccuracy is unequal at different age levels. We have found with the Binet scale of 1908 that an I Q of 110 at age 6 is no more than equivalent to an I Q of 100 at 9, or to 90 at 12. With a scale equally accurate at the different levels we are now in position to follow the actual development of children from year to year.



GRAPH 6. Showing range of months including the middle 50% of mental ages at various years.

Fortunately 18 children who were tested by Childs and Terman in 1911 were tested some two to four years later by the Stanford revision. When the I Q's resulting from the first test were corrected to accord with the shifting of tests in the revised scale it was found that no I Q of the second test differed more than 8 points from the corresponding I Q of the first test. The median difference was only 4. The superior children of the first test are found superior in the second, the average remain average, the inferior remain inferior, the feeble-minded remain feeble-minded, and always in approximately the same degree. Such facts give little support to the traditional belief that intelligence normally develops by alternate leaps and rests; that men of genius develop out of blockheads, and that genius children usually degenerate intellectually as maturity approaches.

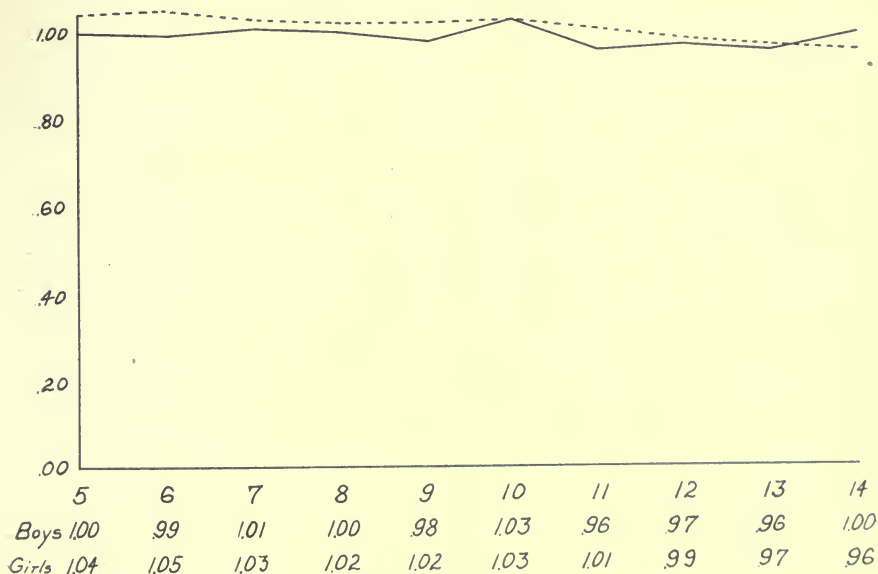
Incidentally it may be noted that if the I Q is a valid expression of intelligence, as it seems to be, then the Binet-Simon "age-grade method" becomes transformed automatically into a "point scale method," if one wants to use it that way. As such it

would seem to be greatly superior to the Yerkes-Bridges scale, for it includes a much larger number of tests and its points have definite meaning and equal value.

If future investigations should confirm the validity of the I Q and its necessary corollaries, the practical consequences would be of the greatest importance, for accurate prediction of a child's later development would then become a matter of everyday practice.

SEX DIFFERENCES

When the I Q's of the boys and girls are treated separately we find a small but fairly constant superiority of the girls up to age 13. At 14 the median I Q for the girls drops suddenly below that for boys. This is shown in graph 7.



GRAPH 7. Showing median I Q for boys and girls separately at each age.
(Total number of boys 457; total number of girls 448)

Apart from the slight superiority of the girls, the distribution of intelligence in the two sexes is not different. The supposed wider variation of boys is not found. The girls do not group themselves about the median more closely than the boys. The

range including the middle 50% is approximately the same for the two sexes.

The supplementary data, including the teachers' estimates of intelligence on a scale of five, the teachers' judgments in regard to the quality of the school work, and records showing the age-grade distribution of the sexes, were all sifted for evidence as to the genuineness of the apparent superiority of the girls age for age. The results of all these lines of inquiry support the tests in suggesting that the superiority of the girls is probably real even up to and including age 14, the apparent superiority of the boys at this age being fully accounted for by the more frequent elimination of 14 year old girls from the grades by promotion to the high school.

However, sex differences in intelligence are so small (amounting on an average to only 2 to 4 per cent. in terms of I Q) that for practical purposes they would seem negligible. We find no reason to share the opinion expressed by Yerkes and Bridges "that at certain ages serious injustice will be done individuals by evaluating their scores in the light of norms which do not take account of sex differences."

THE RELATION OF INTELLIGENCE TO SOCIAL STATUS

In about half our schools it was possible to obtain a classification of the children according to social status. This classification was made by the teachers on a scale of five, "very inferior," "inferior," "average," "superior," and "very superior." The median I Q of the "inferior" group is 93, that of the "superior" group 107; a difference of 14 points. At the age of 7 years this amounts to one year in mental age; at 14 to two years in mental age. By the Pearson method the correlation between intelligence and social status is .40, a result which is fully in harmony with the earlier findings of Binet workers.

The usual assumption has been that such correlation is the artificial product of environmental influences; that the child from a superior home does better because he has had more opportunity to pick up the information needed for success in the tests. A careful sifting of the data has forced upon us the conclusion that the greater part of the difference found is due to an actual average superiority in the endowment of better-class children.

The results of the tests on this point were confirmed by five separate lines of inquiry: (1) The amount of correlation between I Q and social status for children of different ages; (2) a comparison of social status with the teachers' estimates of intelligence; (3) a similar comparison with the teachers' judgments as to the quality of the school work; (4) a comparison of the age-grade status of the children of different social classes; and (5) case studies of exceptionally intelligent and dull children in the same family. The correlation of social status with the teachers' estimates of intelligence was .55, and with the quality of school work .47. The correlation between I Q and social status was .43 for the younger children, .40 for those in the middle years, and only .29 for the older. *In other words, the longer the supposed influence of home environment lasts the more independent of it the I Q becomes.*

These facts and others too involved for presentation here point to the conclusion that the correlation of I Q with social status rests upon actual differences in endowment. In the light of the data available we are unable to agree with the contention of Meumann and of Yerkes that it is unfair to judge the intelligence of any child except in terms of the average intelligence of his own social class. It would seem to us just as logical to insist that it is unfair to the dull or feeble-minded child to judge his intelligence with reference to standard intelligence for normals.

THE RELATION OF INTELLIGENCE TO SCHOOL SUCCESS

Three questions are taken up in this connection: (1) The correlation of I Q with the quality of school work as judged by the teacher; (2) The relation of mental age to grade progress; and (3) The correlation of I Q with the teachers' estimates of intelligence. The correlation with school work is .45, that with teachers' estimates of intelligence .48. Between mental age and grade there are many disagreements, most of which are traced to the tendency of the school to promote children by age rather than by ability.

While these correlations are high enough to confirm in a general way the validity of the Binet method, serious disagreements were found in a considerable number of individual cases. For some of the comparisons about one case in ten showed a disagreement of two steps; that is, where the I Q would have stamped a

child as belonging to the "very inferior" group, for example, the grade progress, or the teacher's judgment of the child's school work, or her estimate of intelligence would put the child in the "average" group, two steps removed, or vice versa.

Inasmuch as findings of this kind have led some to question the value of the Binet rating, it seemed worth while to ascertain the causes of such disagreements. Individual study of these cases showed beyond question that practically every two-step disagreement could be fully explained without questioning the validity of the intelligence test. They were due, in the main, to the teacher's neglect to take account of age differences in rating children's intelligence or school work. Time and again, older retarded who were plainly at the borderline of feeble-mindedness were rated "average" or only "slightly inferior" in intelligence and school work. If the child does ordinarily well the school work where he happens to be located the tendency of teachers is to rate his intelligence and school success "average" regardless of age. Conversely, the intelligence and school success of children who are below age for their grade are constantly underrated by the teacher. The study of grade progress in relation to mental age showed that the over-age dull children whose retardation has been so much lamented are as a rule not retarded, but actually accelerated. Under-grade according to chronological age, they are usually over-grade according to mental age. It appears, therefore, that by far the most common retardation is that due to the failure of teachers to recognize and advance the child of superior ability.

In closing, the opinion is ventured that the measurement of intelligence has already progressed far enough to warrant the testing of every child at the very beginning of his school career in order to determine the direction and extent of his deviation from median intelligence. Certainly all will agree that there is no other fact of greater significance for a child's educational guidance.

ABSTRACTS AND REVIEWS

TRUMAN LEE KELLEY, PH. D. *Educational Guidance. An Experimental Study in the Analysis and Prediction of Ability in High School Pupils.* Teachers College, Columbia University, Contributions to Education, No. 71. New York: Teachers College, Columbia University, 1914. Pp. iv, 116. \$2.00.

No field to which statistical analysis has been applied has been more attractive than that of the study of relationships. The extent to which characteristics and traits vary together has always been one of the sorts of inquiry which have been thought to be most worth while. The accepted means, however, by which the amount of relationship between measurements has been expressed, while mathematically satisfactory, has proved to have restricted practical value. To say that ability in mathematics and ability in science are correlated to such an extent that equals 0.75, leaves a great deal to be desired; and arguments based thereon will be stated very much in accordance with the personal bias of the individual making the argument.

Beyond knowing that +1 means perfect direct correlation, —1 perfect inverse correlation, and 0 absence of correlation, there is little to be said that is convincing. The amount of change which may be expected to take place in a second characteristic when a first one is subjected to a unit change is a question upon which the correlation coefficient throws no light.

In this book, however, we have an extension of the method of statistical analysis beyond the conventional correlation coefficient. By a method which has hitherto been largely confined to speculative treatises, the various r -values are converted into coefficients of regression, and these, when substituted in the general equation of the line of regression, constitute an expression whereby changes in one variable may be shown to imply a definite amount of change in another. In this sense, Dr. Kelley's book stands for a great idea and one which we predict will, in the future, be increasingly present in statistical inquiry. Of course, the regression equation is no new thing as a matter of theory. Its practical application, however, has been almost negligible.

In this book the practical application of the regression equation is concerned with the extent to which the past performances of pupils and the estimates of teachers may be systematically used for "differential prognosis," *i. e.*, for a precise determination of the future performances and capabilities of individuals. Records are available for 59 pupils from the fourth grade of the elementary school through the first grade of the high school, together with the estimates of teachers concerning the ability of the children. There is likewise available, not only for these 59 children, but also for a much larger group, the results of specific tests conducted by the author.

The problem, then, becomes this: Knowing the former grades of pupils, the estimates of their teachers about them, and the results of special testing, what inference concerning their ability in high school work may be drawn, and how does this inference agree with the known performance of the children in their first year in the high school? For this purpose, the estimates of teachers and the results of special tests were found to be considerably inferior to the records of the children for the last four grammar grades. Indeed, the estimate of the probable high school standing, when based upon the grades of the children in the elementary school, was so closely in agreement with the actual standing of the pupils that the correlation was about 0.8, with a probable error of 0.032.

The suggestion is very properly made by Dr. Kelley that pupils' record cards should contain the pupil's rating in each grade. It is indeed true, as he points out, that "a pupil's school record is the most complete, detailed, and accurate of all records of the ordinary pupil, from his entrance in school to his entrance into work." The time, however, is still far distant when pupils' record cards may be expected to contain "a definite statement of the significance of the grades in terms of a normal distribution, or as deviations from the grade mean for the local system in question, expressed as multiples of the variability for that system." Considering the fact that record cards containing the school history of a child are themselves not yet generally introduced, this refinement will, no doubt, have to be reserved for a distant future.

The book about which we are speaking has its faults, and they lie pretty much on the surface. The special tests are not wholly satisfactory, and the scheme of rating them is clumsy; few persons in practical school work could use it. The system of notation with respect to correlation coefficients and coefficients of regression is not

only inelegant from a mathematical point of view, but it does not gain in clearness what it sacrifices in elegance. Considering the character of the persons who will read the book, a consistent appeal to the narrow circle of statistical students only would perhaps have been better. In particular, we should have liked to see a more detailed statement of the calculations by which the regression equations were derived. We take it that the greatest use of Dr. Kelley's book will be stimulation of the kind of analysis, the method of treatment, which he has used; and we regret that he has not introduced greater details concerning his way of working. This he was in a peculiarly favorable position to do. We know of no one who has worked out so many regression coefficients of higher order as he has. The method of doing this is not simple, although it is capable of a simple statement for practical purposes. The labor of calculation is great, though it may be materially reduced if special tables are devised. For instance, a valuable table might be made giving the values and logarithms of the characteristic expression $(1-r^2)^{\frac{1}{2}}$, for given values of r . In short, Dr. Kelley's experience has given him unusual opportunities to assist other workers who may wish to employ his methods.

What has just been said is not to be taken as indicating any failure on our part to realize the unusual excellence of Dr. Kelley's work. He has given a startling instance of one more way in which statistical analysis may serve educational ends. That he has not taught us more about his method we may regret, but, at the same time, we should remember the limitations, both as to space and expense, in the publication of a doctor's dissertation.

B. R. BUCKINGHAM.

Chief Statistician, New York City Schools.

ED. CLAPARÈDE. *Tests de développement et tests d'aptitudes*. Extrait des Archives de Psychologie, 14: 1914, pp. 101-107.

The problem raised here is one of the interpretation of the outcome of tests of intelligence. Suppose a child fail to pass a given test which is passed on the average by other children of his age: does this indicate that the child is *below* his mental age? Evidently not, because it may indicate merely that he is *other than* the average child of his age. In the former case the test may be said to measure mental *development*, in the latter mental *aptitude*. If a 12-year-old child does poorly at singing or drawing, to take an obvious illustration, no one would regard this as clearly significant of mental retardation. To

be sure, if our age differences are large enough, say 5 and 12 years, the differences in performance even in singing or drawing, would be primarily developmental differences, but if our age differences are small, say 11 and 12 years, the share in mental performances attributable to development becomes more uncertain.

The question then arises: how are we to know whether a given mental test is a test of development or a test of aptitude. *A priori* speculation, like the divisions of the Binet tests suggested by Meumann and others, is, in Claparède's opinion, less reliable than some objective criterion. And this criterion he would find in the empirical distributions of the results actually obtained from tests as conditioned by age. Thus, if the curves of distribution for a given test when applied to 10-year and to 11-year children are distinctly separated from one another, the dependence of the test upon age is clean-cut and well established; if the curves are identical there is no dependence on age. In actuality, since such distributions overlap to a greater or less extent, the question becomes: what amount of overlapping may be permissible in tests which are regarded as diagnostic of developmental status? To this query, the author replies that a difference between the averages of the two adjacent years amounting to the magnitude of the probable error of the means, or even of twice the probable error, is certainly not sufficient to regard the test as characteristic of the age in question. Perhaps, he thinks, a difference of four times the probable error may be sufficient.

The reviewer would suggest that the reliability of the differences between the means established for adjacent ages by any mental test would very naturally be determined by the mathematical formulas for calculating the reliability of differences of means generally. For scientific purposes it is conceded that any measure, to obtain credence, ought to be three, or better four, times its probable error. A difference in the averages of two adjacent ages amounting to four times its probable error would appear by chance once in 143.3 times. We have, therefore, already at hand a mathematical justification for the recommendation that Dr. Claparède makes tentatively from inspection of curves of distribution. A good illustration of the application of the issue raised here is afforded by the results reported in the reviewer's *Manual of Mental Tests*, 2d edition, Part II, page 658, where it appears that the Ebbinghaus completion test exhibits no progress with age (from 13 to 19 years) but a decided progress with school grade (8th to 12th).

G. M. W.

THE JOURNAL OF EDUCATIONAL PSYCHOLOGY

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EDITORIAL

Most of us would agree that the cardinal problem raised in educational psychology is the nature and limitations of training. Special aspects of this general problem, notably the problem of formal discipline, or the transfer of training, and the effect of practice upon the acquisition of skill, have received extensive consideration. But one of the primary aspects of the problem, that of the training of the senses, has had curiously little discussion, if a somewhat hasty survey of the textbook literature is any criterion. On the other hand, much of the current philosophy of education—in so far as modern kindergarten practice or the methods of “educating” the feeble-minded or the Montessori fad may be said to have any philosophy of education—seems to take it for granted that devices for training the senses of young children are both necessary and valuable. Without attempting to deny that in some instances systematic instruction in the handling of concrete objects may produce a noticeable and measurable improvement in the capacity of young children to identify objects

surely and quickly, to distinguish small differences in pitch, color, form, weight, etc., or to estimate lengths, durations, weights, etc., I should like to interpose the following objections against the doctrine of sense training as commonly interpreted. (1) To take the doctrine so literally as to advocate the presentation to the infant of as many as possible of the thousands of sense impressions themselves (the 11,000 tones, the 35,000 colors, the four tastes, etc.) is a manifest absurdity, because, even if it were possible, as some extremists think, to develop in this way correspondingly many brain cells, the net result would not be to augment by one jot or tittle the natural development of intelligence. (2) Nature has provided in the guise of numerous instinctive tendencies (particularly those evinced in play) a very efficient machinery for provoking and promoting acquaintance with the world about us as fast as the central nervous system can proceed with the acquainting process. It may be debated, then, whether we need to "carry coals to Newcastle" in an endeavor to assist or hurry this process. (3) Nature has also provided a curious surplusage of efficiency in our sense-organs as it is. The normal ear can discriminate differences of pitch much smaller than the smallest musical interval. The skin can discriminate a fraction of a degree, Fahrenheit. The eye can detect a brightness difference of one one-hundredth. (4) In those individuals whose sensory mechanism is so defective as to fall far short of these normal capacities no amount of subsequent "education" seems to remedy the deficiency—witness color-blindness or tonal deafness. (5) When we do encounter instances in which systematic training appears to have improved the performance of the senses, we invariably, so far as my knowledge goes, locate the improvement in some one or more central factors, like direction of attention, ability to understand what is to be looked at, or listened to, or smelled of—witness any careful experimental analysis of the factors that condition improvement in observation or discrimination. Here again, then, there is, *sensu stricto*, no such thing as "sense training."

All in all, it would appear that a careful critique of the doctrine of sense training would be a very acceptable contribution just now to the literature of educational psychology.

G. M. W.

NOTES AND NEWS

The University of Indiana announces the establishment of a Bureau of Co-operative Research in Education. Its purpose is to assist superintendents, principals, and teachers in the scientific study of educational problems and to collect and publish such material and investigations as will further the growth of educational science. For the year 1915-16, it announces work along the following four lines: (a) studies in arithmetic by means of the Curtis Standard Tests, series B; (b) studies in reading, by means of the Thorndike Reading Scale; (c) studies in spelling, by means of the Ayres and Buckingham spelling scales; (d) studies in unit cost of high school instruction. The work of the bureau is under the direction of Associate Professor, M. E. Haggerty.

Calls for educational tests from schools and colleges from Kansas and other states have been received in large numbers by the Bureau of Educational Measurements and Standards of the Kansas State Normal School at Emporia. Over seventy-five applications have been made in the last six months. The tests comprise reading, writing, arithmetic, spelling, drawing, composition, and vocabulary tests.—*School and Society*.

Dr. David Spence Hill, director of the bureau of educational research, New Orleans public schools, is engaged in a first-hand study of the system of instruction prevailing in the schools. As a part of this survey, he is spending an entire day with a typical class of each grade, in order, as far as possible, to become familiar with the work of the grade from the standpoint of the pupil. Other phases of the survey deal with the program of study, the subject matter of the texts used, tests of the accomplishment of New Orleans pupils as compared with those of other cities in spelling and arithmetic, a study of promotional examinations, and vocational studies. The clinical studies of individual children will be continued, and statistical measurements of the whole system will be carried on.

The School Lunch Committee of the Home and School League of Philadelphia has disbanded after an existence of eight years. Its

work of experimentation and demonstration has resulted in the establishment of lunches in the elementary schools of the city, and in their successful maintenance on a self-supporting basis. The work has now been taken over by the board of education and has been made an integral part of the school organization. At the May meeting of the board, the final recommendations of the School Lunch Committee were adopted, and the superintendent of schools was authorized to extend elementary lunch service immediately to twenty-five additional schools. The final report of the committee, a pamphlet of sixty-three pages, is a valuable contribution to the subject, giving a history of the movement, typical menus, and costs of service.

The Municipal University of Toledo, Ohio, is offering twelve two-hour courses in education at hours convenient for the teachers of the city. Among these courses are "History of Education," and "Problems of Educational Administration and Supervision," by Professor David Henry; "Stories and Story Telling," "Teaching Upper-Grade Arithmetic and Language," and "Principles of Teaching," by Professor Josephine Leach, and "Secondary School Organization and Management," "Principles of Education," and "Adolescence," by Professor A. W. Trettien.

Courses for teachers, at convenient Saturday forenoon or afternoon hours, and primarily for the benefit of Cleveland and vicinity, will be given at Western Reserve University during the present semester. The course were organized October 2. College credit may be given to those satisfying entrance and other conditions.—*School and Society*.

At Tufts College Professor Karl Schmidt, head of the department of education, is offering a course in principles of secondary education to those seniors who are planning to enter the teaching profession. An agreement has been reached with the Somerville School Committee to extend to students the privilege of attending the high school for observation and for engaging in practice teaching. In return for this privilege the college will give free teaching courses to teachers in the Somerville schools.—*School and Society*.

In New York City the Board of Estimate has refused to sanction a larger appropriation for school purposes than was voted last year.

Comptroller Pendergast, chairman of the Board's committee on education, has recommended an extension of the school year to forty-four weeks, a lengthening of the school day from five to six hours, the total elimination of extra pay to teachers for service in vacation schools, a reduction of ten per cent in the number of positions for teachers, promotion of teachers on the basis of merit alone, and the reduction of the common school course from eight to seven years. He heartily commends the application of the Gary plan, and believes that the school system would be improved and the city saved much money by the changes suggested.

Professor W. C. Ruediger has been appointed Director of the newly authorized summer school to be held by George Washington University at Washington, D. C. The school for 1916 will begin June 26th and continue for six weeks.

Miss Anna J. McKeag, for four years president of Wilson College, has resigned that position to accept the professorship of the history and principles of education, at Wellesley College.

Mr. Ernest O. Holland, superintendent of schools at Louisville, Kentucky, has been elected to the presidency of Washington State College. He will succeed Dr. Enoch A. Bryan, who will retire next January.—*School and Society*.

During the latter part of October Professor M. V. O'Shea of the University of Wisconsin delivered a number of addresses in the East. He gave two addresses in Boston, one to a convention of Secondary School Masters and Teachers in Tremont Temple, and one to the Home and School Association affiliated with the Boston Latin School. He gave addresses also to the faculty and students of the Hotchkiss School in Connecticut.

Arnold Gesell (Ph. D., Clark University, 1906) has completed the medical course at Yale University and has been appointed professor of child hygiene in the Yale Graduate School. After a year's leave of absence he will serve also as State Inspector of Special School Children under the Board of Education of Connecticut. This is the first state to designate a separate inspector for special school children and indicates a commendable disposition on the part of the

state board to adapt the supervision exercised by the state over the schools to the needs of all pupils. It is to be hoped that the term "special school children" will not be limited to those who deviate from their fellows on account of defects, but that it may also be the duty of the inspector to pay some attention to specially gifted children. The opening for Dr. Gesell is a splendid one, and he is well fitted both by training and by experience to give the state excellent service.

Dr. Joseph E. DeCamp, last year assistant in the department of psychology at the University of Illinois, has been appointed instructor in psychology at the University of California. His place at Illinois has been filled by the appointment of Mr. Gerold Wichmann, A. B., of the University of Chicago.—*School and Society*.

The twenty-fourth annual meeting of the American Psychological Association will be held at the University of Chicago, December 28, 29 and 30, 1915. The annual dinner-smoker with the address of the president, Professor John B. Watson, on "The Place of the Conditioned-Reflex in Psychology," will occur at the Quadrangle Club, Wednesday evening, December 29. A special feature of the program will be a discussion of the relations of psychology to the subjects of philosophy, of science and of pedagogy in the curriculum. The local member of the executive committee, in charge of the meetings, is Professor H. A. Carr of the University of Chicago. Communications which concern the program may be addressed to the secretary, Professor R. M. Ogden at Lawrence, Kansas.

The following committees of the Society of College Teachers of Education for 1915-1916 have been announced:

Committee on School Surveys (Continued): M. B. Hillegas, Columbia University; Alexander J. Inglis, Harvard University; H. W. Josselyn, University of Kansas; Chas. H. Judd, Chicago University; E. C. Moore, Harvard University, chairman.

Committee on Organization Plan of Placing Bureaus of Colleges and Universities: Will G. Chambers, University of Pittsburgh; Lotus D. Coffman, University of Minnesota; V. A. C. Henmon, University of Wisconsin; H. W. Josselyn, University of Kansas; W. H. Kilpatrick, Columbia University; Edward E. Rall, University of Tennessee; H.

D. Sheldon, University of Pittsburgh; Frank E. Thompson, University of Colorado, chairman; A. S. Whitney, University of Michigan.

Committee of Securing Uniform or Better Practice with Reference to Issuing State Certificates to College Graduates: William H. Black, Indiana University; H. T. J. Coleman, Queen's University, Ontario; W. W. Charters, University of Missouri; E. L. Holton, Kansas Agricultural College; Charles H. Johnston, University of Illinois; Bruce R. Payne, George Peabody College for Teachers; Harlan Updegraff, University of Pennsylvania, chairman.

Committee on Methods of Practice Teaching for Future Secondary Teachers: Fred C. Ayer, University of Oregon; H. C. Dorcas, University of Iowa; Alexander J. Inglis, Harvard University, chairman; T. J. Kirby, University of Pittsburgh; A. R. Mead, Ohio Wesleyan University; Junius L. Meriam, University of Missouri; Samuel Chester Parker, University of Chicago; Wm. F. Russell, George Peabody College for Teachers.

Standardizing Colleges, Schools and Departments of Education: Carter Alexander, George Peabody College for Teachers; Edward C. Elliott, University of Wisconsin; Charles Fordyce, University of Nebraska; W. W. Kemp, University of Montana; Paul Monroe, Columbia University, chairman; Edward E. Rall, University of Tennessee; A. S. Whitney, University of Michigan.

Committee on Proposal for Uniform Nomenclature in Education: W. C. Bagley, University of Illinois, chairman; W. W. Charters, University of Missouri; Edward C. Elliott, University of Wisconsin; Ernest N. Henderson, Adelphi College; Henry Suzzallo, Columbia University; G. M. Wilson, Iowa Agricultural College; John M. Withers, Harris Teachers College.

Committee on Rating of Normal Schools in Relation to Departments of Education in Colleges and Universities (Continued): Carter Alexander, George Peabody College for Teachers; F. E. Bolton, State University of Washington; James J. Doster, University of Alabama; W. A. Jessup, University of Iowa, chairman; Charles Hughes Johnston, University of Illinois; W. C. Ruediger, George Washington University; G. D. Strayer, Columbia University; Harlan Updegraff, University of Pennsylvania.

CURRENT PERIODICALS

SCHOOL REVIEW. Vol. XXIII, No. 2, February, 1915. J. H. MINNICK. *A Comparative Study of the Mathematical Abilities of Boys and Girls.* 73-84. A comparison of the class grades in the mathematics work of 150 boys and 243 girls in the Bloomington, Indiana, high school. The author also studied the relative achievements of boys and girls in mathematics in comparison with their standing in other subjects, as English, history, language, and science. The results show very little difference in achievement between boys and girls. Among the retarded student mathematics gives slightly more trouble to girls than to boys, and it is a slightly stronger factor in the elimination of girls than in the elimination of boys. On the whole, mathematics would seem to be about as well suited to girls as are history and science.

No. 3. March, 1915. WALTER S. MONROE. *A Test of the Attainment of First Year High School Students in Algebra.* 159-171. A series of six tests involving simple algebraic equations with numerical coefficients and numerical denominators were given to twelve classes of first year students in two city high schools. The class averages and average deviations are given for all the tests, and a more extended study is made of the results of the sixth test. The correlations of the various tests with each other are relatively small, indicating that each test calls for a different ability. The coefficient of correlation between the number attempted and the number right is high, indicating that speed and accuracy go together.

No. 6. June, 1915. W. F. ROECKER. *An Objective Study of the Rating of Traits in School Achievement.* 406-410. In the Wisconsin High School of the University of Wisconsin, report cards are issued every six weeks, and these reports indicate not only the rating of the pupils in scholarship, but also in industry, initiative, attention, attitude, and improvement. A table is given presenting the records of a typical class. The author finds the correlation between scholarship and the other traits to be high. The plan enables the pupil to determine his own weaknesses, furnishes the teacher with a useful record of judgments on the pupil's attainments, and makes it possible to approximate closely the native ability of the pupil.

No. 8. October, 1915. RALEIGH SCHORLING. *The Problem of Individual Differences in the Teaching of Secondary School Mathematics.* 535-549. An account of the methods used in various institutions to train practice students to meet the individual differences of high school pupils. The latter part of the article is devoted to an account of an experiment in the use of bright students as in-

structors of slow students. A group of second year high school pupils was divided into two sections of approximately equal ability. A series of twelve lessons, identical in content, was given to the two sections. One-third of the recitation period was taken by the instructor in an inductive presentation of the subject; for the remaining two-thirds of the period the pupils of section B worked independently under the supervision of the instructor. The students of section A, on the other hand, worked in groups at desks and at the blackboard. In the latter section the instructor discouraged independent work. After eight recitations, the two classes were given the same examination, and a similar test was made after the twelfth recitation. Papers were graded by the instructor's colleagues. For a second series the method was reversed; and at the close of the test, another examination was given. In each case the section that studied independently showed a decided increase in the variability of the distribution of the pupils. This increase was correspondingly diminished as soon as the pupils began to work together again in groups.

SCHOOL AND SOCIETY. Vol. I, No. 2. January 9, 1915. GREGORY D. WALCOTT. *A Statistical Study of Doctor of Philosophy Men.* 66-71, and 102-107. The article presents a comparison of the number of men taking the bachelor's degree with those taking the doctor's degree in typical universities of the country in the two decades, 1885-1904. Tables are given showing the average number of years of study for each of the degrees, the coefficients of correlation for each college, and the place where the advanced degree was taken. In the second installment, the study is extended to include the subsequent careers of doctor of philosophy men, and their attainments in active life. The ratio of college graduates to those who obtain doctor's degrees is one to twenty-two, and this gives prospect of remaining fairly constant.

No. 4, January 23. JOHN PERRY. *The Need of a Science of Education.* 114-126. The president of the Educational Science section of the British Association for the Advancement of Science proclaims that the science of education is still to be created. The address is a severe arraignment of contemporary education in England. The author pleads for more attention to English and science, and less emphasis on the classics.

No. 6, February 6. FRANK W. BALLOU. *The Function of a Department of Educational Investigation and Measurement in a City School System.* 181-190. The author believes that the function of such a department is three-fold: first, a definition of minimum essentials in each subject of the course of study; second, the establishment of objective standards of achievement for the benefit of both pupils and teachers; third, scientific experimentation in methods of instruction, as a means of improving the work of the school. The article outlines the work attempted in Boston in the subjects of arithmetic, spelling, geography, and English, and in the rating of teachers according to merit.

No. 10. March 6. HENRY S. PRITCHETT. *Standards and Standardizers*. 336-339. A defense of the attempts of the Carnegie Foundation to devise standards for indicating the work done by high schools and colleges; and a discussion of the significance of the establishment of standards in education.

W. H. PYLE. *The Mind of the Negro Child*. 357-360. An account of the application of Pyle's tests for memory, rate of learning, association, and reaction to ink blots to four hundred and eight negro children in Missouri public schools. Tables are presented giving the average response for negroes and whites in each test at each year of age from eight to sixteen for boys and girls separately. White boys are invariably superior to colored boys, ranging from a very slight superiority in the cancellation test to four times as good a response in the genus-species test. Negro girls are slightly superior to white girls in the cancellation test, but are inferior in all other tests. The disparity is again greatest in the genus-species test, with a ratio approximating one to three.

No. 11. March 13. WALTER S. MONROE. *Measurements of Certain Algebraical Abilities*. 393-395. A brief account of the study of the ability of first year high school students to deal with simple equations, reported in greater detail in the *School Review*. The author concludes that increased accuracy is due to increased interest in the subject and to the reduction of knowledge of fundamental rules to the plane of automatic application.

No. 12. March 20. EDWARD L. THORNDIKE. *The Relation Between Initial Ability and Improvement in a Substitution Test*, 429-431. The article deals with the results of the practice of one hundred twenty-three college students in writing the products of two-place by two-place numbers. The author concludes that it is unsafe to assume that individual differences are due chiefly to the different opportunities which the individuals have enjoyed, and that the result of a given amount of practice is highly prophetic of the status which will be obtained by any given amount of additional practice.

No. 13. March 27. S. A. COURTIS. *Objective Standards as a Means of Controlling Instruction and Economizing Time*. 433-436. The author points out the importance of both speed and accuracy for efficiency of work in any field of practical endeavor and considers certain consequences of the establishment of objective standards in educational work. The first of these is the doctrine of the limitation of training, according to which there is a point in each pupil's development beyond which the returns of accomplishment are so limited as to make the expenditure of time and effort uneconomical. A second important consequence is the economy of time in class-room management.

No. 14. April 3. A. DUNCAN YOCUM. *The Compelling of Efficiency Through Teacher Training*. 469-477. In this article the

author views the teaching process from the standpoint of causation. All the responses that an individual is able to make are responses to some feature of the environment; and if in education, that environment can be properly controlled, the efficiency of the process is secured. The five forms of effective control are: the cumulative impression, which definitely centers the direction of the pupil's mental activity; the vocabulary; varying inter-connection of details; habit and system; and the transfer of training in one field to other fields of experience.

H. B. WILSON. *Minimum Essentials in Elementary School Subjects*. 198-503. Extracts from the report of the Committee on the Economy of Time in Education. The committee believes that the elementary and secondary period of education could be profitably shortened two years. The reasons for this belief, and the lines in which saving could be made are convincingly set forth.

No. 15. April 10. M. R. TRABUE. *Some Results of a Graded Series of Completion Tests*. 537-540. The tests consist of fifty-six mutilated sentences dealing with common experience. Examples of these sentences are given, and the statistics of their application to several thousand children in the public schools of New York and New Jersey are set forth.

No. 16. April 17. BIRD T. BALDWIN. *The Application of the Courtis Tests in Arithmetic to College Students*. 569-576. The author presents by means of graphs and tables of correlation the results of applying the tests of series B to one hundred sixty-four college students. The average result lies near the norm set up by Mr. Courtis for the 10th grade. Language, mathematics, and science students were found to be rapid but not accurate, engineers were less rapid but more accurate, while English, public speaking, economics, and history students rank below the others in both speed and accuracy.

No. 17. April 24. LEONARD P. AYRES. *School Surveys*. 577-581. Traces briefly the source and history of the school survey movement and gives some of the characteristics of good surveys and the reasons why they are becoming more popular.

JAMES FLEMING HOSIC. *The Essentials in Composition and Grammar*. 581-587. Discusses the Hillegas and Ballou composition scales and recent experimental studies on the significance of grammar for work in language. The author believes that the teaching of much that is now stressed in these subjects must be eliminated.

EDWARD K. STRONG, JR. *Teacher Training*. 587-593. Discusses ways and means of making psychology function more effectively in the work of teachers.

No. 18. May 1. ADAM LEROY JONES. *Memoranda from the Records of a few College Freshmen*. 626-630. A study of the

correlation between entrance examination records and records in college work.

CLELIA DUEL MOSHER. *The Schematogram—A New Method of Graphically Recording Posture and Changes in the Contours of the Body.* 642-645. The article gives a description of the apparatus and illustrates its use with diagrams.

No. 19. May 8. JOHN W. WOOD, JR. *The Educational Balance Sheet.* 679-684. The scheme of a balance sheet similar to that drawn up at intervals in large factories is given in detail, and illustrated with applications to concrete situations. It is a very helpful device to enable principals and teachers to judge of the efficiency of their work.

No. 21. May 22. HELEN THOMPSON WOOLLEY. *The Issuing of Working Permits and Its Bearing on Other School Problems.* 726-733. Points out various ways in which the office issuing working permits may contribute to a better adjustment between school training and subsequent careers in business and industries.

J. B. SEARS. *Occupations of Fathers and Occupational Choices of 1039 Boys in Grades Seven and Eight of the Oakland Schools.* 750-756. The study shows that the fathers of the boys follow sixty different occupations, and that the choices of the sons include fifty-six occupations. Many of the latter are different from the former so that eighty different callings are represented. Only seven and three-tenths percent of the boys preferred their fathers' callings.

No. 22. May 29. LOUIS W. RAPEER. *College Pedagogy,* 777-781. A list of thirty-three points indicated as qualities of a good college instructor by college seniors and juniors.

No. 25. June 19. HARRIS HANCOCK. *What Course of Study Should be Taken by a Boy Who Is Entering High School?* 893-900. A tabulation of answers submitted by prominent business men; theologians, lawyers, and physicians to the question, "What course would you advise a boy to take on entering the high school?" The professional men in a great majority of cases advocate a course requiring both classics and mathematics. A larger number of business men would make classics optional and some would also include mathematics among the options.

PUBLICATIONS RECEIVED

ALDA GRACE BARBER. *The Localization of Sound in the White Rat*. Reprinted from *The Journal of Animal Behavior*, July-August, 1915, vol. 5, no. 4, pp. 292-311.

The author finds that the white rat is able to localize a noise with an average accuracy of from two to four inches. The association between such an accuracy of localization and food is established in from 40 to 136 trials. The animals showed no ability to localize tones from tuning forks, or clangs from an organ pipe. Indeed, tones were absolutely ignored. The localizing association was retained practically unimpaired for forty days.

FREDERICK BETZ. *Vom grossen Koenig und anderen*. Cincinnati: The American Book Company, 1915. Pp. 216.

A collection of interesting and easy anecdotes from German history. Intended for beginners in German. There are many illustrations.

FRANK W. BLACKMAR AND JOHN LEWIS GILLIN. *Outlines of Sociology*. New York: The Macmillan Company, 1915. Pp. viii, 586. \$2.00.

This book is intended as a textbook for college and university classes and as a comprehensive survey of the field for the general reader. Part One defines and indicates the scope of sociology and the purpose and methods of the study. Part Two treats of social evolution and deals with such topics as the origins of society, social organizations, the family, the state, the production and consumption of wealth, and the rise of ethics and religion. Part Three discusses socialization and social control with particular attention to the psychological factors that are active in social groups. Part Four outlines the various types of social control in relation to the development of social ideals, such as ideals of government, control by force, the enlightenment resulting from education, and the ideal of justice. Part Five enumerates the more important forms of social pathology, as poverty, crime, and social degeneration, and reviews modern attempts at treating social diseases. Part Six develops the field and methods of social investigation, and Part Seven presents a sketch of the history of sociology. It is an ably conceived and carefully wrought-out book, and presents many topics of interest to the psychologist and educator.

MEYER BLOOMFIELD. *Readings in Vocational Guidance*. Boston: Ginn and Company, 1915. Pp. xv, 723.

School administrators are realizing as never before that it is the function of education to prepare for life, and that both the public and the pupils have a right to demand that education should be so adjusted as to fit the boy or girl for the kind of work for which he is best adapted. Hence, there is a rapidly growing interest in the subject of vocational guidance. The literature of the subject, however, is widely scattered in reports and periodicals that are not accessible to the ordinary student. The author has, therefore, rendered a signal service in bringing together in this volume the most important contributions to the subject. In Part One the viewpoint of vocational guidance is developed, and the relation of such work to the ordinary routine of the school is discussed. Part Two treats of the foundations of vocational guidance, giving a large number of illustrative examples of efforts to direct pupils in their choice of vocations in different cities. Part Three presents examples of vocational information, giving the status and possibilities of advancement for the architect, the grocer, the machinist, the telephone operator, the building trades worker, the bookbinder, and other occupations open to boys and girls. Finally, in Part Four some practical aspects of vocational guidance are considered. The book contains an abundance of valuable information on the subject.

GEORGE M. BRACE AND D. D. MAYNE. *Farm Shop Work*. Cincinnati: The American Book Company, 1915. Pp. xii, 291.

An excellent practical manual in wood-working, black-smithing, cement and concrete work, and harness making. It should be found in every rural school.

SAMUEL PAUL CAPEN. *Accredited Secondary Schools in the United States*. Bulletin Number 631, Washington: Bureau of Education, 1915. Pp. 106.

There is a brief discussion of what constitutes an accredited school, a definition of "unit," and a discussion of methods of accrediting. The remainder of the bulletin is devoted to the lists of accredited schools arranged by states.

SAMUEL PAUL CAPEN. *Opportunities for Foreign Students at Colleges and Universities in the United States*. Bulletin Number 654. Washington: Bureau of Education, 1915. Pp. 213.

The bulletin presents a brief historical sketch of the evolution of higher education in the United States, discusses the organization of the leading schools and colleges found in the typical university, com-

pares American with foreign institutions, presents an account of living conditions, the activities of college life, higher educational centers, college entrance requirements, typical curricula, degrees conferred by various institutions, and the organization and offerings of sixty-two institutions of higher learning. While intended for foreign students, the information presented is of distinct interest to American students also.

ED. CLAPARÈDE. *Les types psychologiques et l'interprétation des données statistiques*. Extrait de l'Intermédiaire des Éducateurs, Nos. 24-26, 1915, pp. 33-43.

Professor Claparède calls attention to the fact that the drawing of conclusions as to the mental "type" to which an individual belongs from his response to a mental test, as, for example, in Binet's description-of-an-object test, is always subject to uncertainty in that the test may have revealed merely one of a number of different responses possible to the same individual. He then goes on, in a rather ingenious way, to transfer the problem to the throwing of dice and thus at the same time to show how the reliability of any such conclusions as to "types" can be determined by the application of the statistics of probability.

BERTHA M. CLARK. *An Introduction to Science*. Cincinnati: American Book Company, 1915. Pp. 494.

"The aim of this book is to start young high school pupils on scientific projects which will influence for good their present lives and which under different guise will equally influence for good their future lives." Among the topics treated in the forty-four chapters of the book are the following: heat, food, fuels, clothing, household chemicals, metals, drugs and patent medicines, modern electrical devices, light and photography, sound, machines, pumps and water systems, air and climate, rocks, plants, and animals and their relation to man. The book is profusely illustrated.

ELLWOOD P. CUBBERLEY. *Report of a Survey of the Organization, Scope, and Finance of the Public School System of Oakland, California*. 1915. Pp. 48. 10 cents.

The three parts of this survey deal with the form of organization, the scope and needs of the Oakland school system, and the financial phase of the school problem.

HENRY S. CURTIS. *The Practical Conduct of Play*. New York: The Macmillan Company, 1915. Pp. xi, 330. \$2.00.

"This volume is intended as a textbook for those who are preparing themselves for playground positions, and as a practical manual

for all who have to do with the organization of play, whether as parents, as teachers, as play ground directors, or as supervisors. To this end the aim has everywhere been to give definite detailed information and suggestions, such as can be easily followed and will be helpful in the daily work of the director." The author treats the construction of play grounds, their equipment, the swimming pool, the organizing of play, the training of play directors, the play ground attendants, the curriculum of play, the play festival, and play ground discipline. It is a valuable book for teachers, principals, and supervisors of the play activities of children.

JOHN DEWEY AND EVELYN DEWEY. *Schools of Tomorrow*. New York: E. P. Dutton and Company, 1915. Pp. 316. \$1.50 net.

A very interesting and useful account of present tendencies in education, and of schools that exemplify these tendencies. The philosophical background of the book is derived largely from the teachings of Rousseau. Among the special schools described are those of Mrs. Johnson at Fairhope, Alabama, the elementary school of the University of Missouri, directed by Prof. J. L. Meriam, Public School 45 of the Indianapolis School System, the Francis Parker School, Chicago, the Phoebe Thorn Experimental School of Bryn Mawr College, the School of Interlaken, Indiana, the Little School in the Woods, at Greenwich, Conn., Miss Pratt's Play School, New York City, the Teachers College Kindergarten, and the Gary System in Indiana. There is an appreciative account of the Montessori idea, and a discussion of the fundamental principles which underly all of these attempts to break away from the traditional organization of the schools.

JEANNETTE EATON AND BERTHA M. STEVENS. *Commercial Work and Training for Girls*. New York: The Macmillan Company. 1915. Pp. xviii, 289. \$1.50.

The material for this book was collected and put into form under the auspices of the Co-operative Employment Bureau for Girls, Cleveland. The topics dealt with include public and private commercial schools, night commercial schools, the efforts of commercial schools to draw pupils from public schools, vocational guidance, and a summary of recommendations for legislation. In Part Two there is a classification of office work based on the study of 2618 office positions, a discussion of the development of work for women, the conditions of office work, and the just demands of the employer. The data have the value of having been collected from actual concrete business conditions.

Feeble Minded in Ontario. Ninth Report. Toronto, 1915. 29 pp.

This is Dr. MacMurchy's report for the year ending October 31, 1914. It covers a variety of aspects of the general problem of the feeble-minded. The two most important events in the year were the passing by the Ontario legislature of an Act empowering the establishment of special classes for mental defectives and the opening at the Toronto General Hospital of a special clinic for the private examination of mentally defective children and adults.

Francis W. Parker School Year Book. Education through Concrete Experience. Chicago: Francis W. Parker School, 1915. Pp. 186. 35c.

Interesting chapters are: Mental Imagery in Geography, The School Museum, the Pupil's Experience as the Source of his Problems in Arithmetic, Experience Building in the Teaching of Geometry, and the Value of Games in the Teaching of Modern Languages.

SHEPHERD IVORY FRANZ. *On the Functions of the Cerebrum. I. Symptomatological Differences Associated with Similar Cerebral Lesions in the Insane. II. Variations in Distribution of the Motor Senses.* The Psychological Monographs, Vol. xix, no. 1, April 1915. Whole No. 81. Pp. 162. \$1.50.

The extreme localization of function in the cerebral cortex which is set forth by many writers in psychology receives a severe blow from the studies reported in this monograph. Whether we deal with the cerebral lesions of insane patients or with experiments on lower animals, the conclusion is forced home that the same forms of behavior are not always due to the activities of the same cerebral cells. The explanations of changes in mental life offered by the neural psychologists have been much too highly simplified and schematized. The actual neurological connections appear to be extremely complex, and the nervous interrelations are such that after a short time one portion of the cortex may perform most of the functions of other more or less distant areas.

ELEANOR A. MCGAMBLE. *A Defence of Psychology as a Science of Selves.* Reprinted from the Psychological Bulletin, Vol. 12, No. 5, May 1915. Pp. 194-201.

This is a reply to Miss Josephine Curtis' attack on Miss Calkins' conception of psychology.

EDWIN GREENLAW. *Familiar Letters, English and American.* Chicago: Scott, Foresman and Company, 1915. Pp. 309. 40c.

Among the well known writers from whose correspondence selections are made are Thomas Grey, Benjamin Franklin, William Cow-

per, George Washington, Charles Lamb, Washington Irving, Jane Welch Carlyle, Charles Dickens, Abraham Lincoln, R. L. Stevenson, and T. H. Huxley.

THOMAS H. HAINES. *The Ohio Plan for the Study of Delinquency*. Reprinted from *Popular Science Monthly*, June 1915, 576-580.

An account of the new Ohio law establishing a bureau of juvenile research under the auspices of which delinquent children are to be studied from the standpoint of biology, psychology, and sociology. Doubtful cases of defective delinquents will be given experimental treatment in special schools, while the non-defective delinquents will be saved from institutionalization.

THOMAS H. HAINES. *Point Scale Ratings of Delinquent Boys and Girls*. Reprinted from the *Psychological Review*, Vol. 22, No. 2, March 1915, 104-109.

Two hundred delinquents in Ohio industrial schools were examined both by the Binet method and the Yerkes point scale method. There is a very considerable difference between the two ratings, particularly above ten years. The point scale ratings are from two to four years higher than those obtained by the Binet scale. The author thinks that the point scale ratings are the more reliable.

WILLIAM HEALY AND MARY TENNEY HEALY. *Pathological Lying, Accusation, and Swindling*. Boston: Little, Brown and Company, 1915. Pp. xi, 286. \$2.50 net.

This book is Number One of the Criminal Science Monographs—a supplementary series to the *Journal of the American Institute of Criminal Law and Criminology*. The authors give a resume of previous studies, especially from German and French sources, and give a detailed account of twelve cases of pathological lying and swindling, nine cases of pathological accusation, and six cases of border-line mental types. In view of the frequency with which such cases of lying are brought to the attention of the teacher, and of the importance of knowing how to deal with them skillfully and effectively, the book should be widely read by educators. It is perhaps the first time that the "Aussage test" developed by Stern has been used as a means of routine diagnosis of mental defects. The material here brought together is of the greatest value to the educator for the light that it throws upon a particularly troublesome type of school offenders.

ETHEL HUESTON. *Prudence of the Parsonage*. Indianapolis: The Bobbs-Merrill Company, 1915. Pp. 347. \$1.25.

A pretty love story depicting the life of the Methodist minister in a small village of the middle west. The romantic heroine seems a bit

stupid and obstinate however in her refusal to do the obvious thing, and accept the happiness fate thrust upon her.

WALTER S. HUNTER. *The Auditory Sensitivity of the White Rat*. Reprinted from the Journal of Animal Behavior, Vol. 5, No. 4, July-August 1915, 313-329.

There is a practical insensitivity to many pitches in the lower region of the scale for the white rat. This apparently goes along with a sensitivity to noises of the same predominant pitch. Apparent reactions to tone are most probably made to accompanying noises.

JOSEPH KENNEDY. *Fundamentals in Methods in Elementary Schools*. New York: The Macmillan Company, 1915. Pp. xxiv, 321. \$1.40.

"The purpose of this book is not to serve as a consecutive and detailed methodology, but as a discussion, as concretely illustrated as possible, which will, it is hoped, awaken or arouse elementary teachers to a realization of many common-sense injunctions or warnings which need only be mentioned, to be obeyed or avoided. It is intended to discuss many of the chief points or turns of procedure, and of methods in the large; to point out fields and directions to be sought and followed or to be shunned and avoided." The titles of the chapters are The Teacher and Methods, Clear Picturing, the Most Prevalent Mistakes (Telling vs. Teaching), the Recitation Period, Reading, Woodwork, Writing, Language Work, Arithmetic (elementary), Arithmetic (advanced), Geography, History, Hygiene, the Teaching of Morals, the Special Subjects, and Methods in School Management. The book presents a very attractive appearance, and bridges the yawning gap between pure theory and practical applications.

SAMUEL C. KOHS. *A New Departure in the Treatment of Inmates of Penal Institutions*. Publications of the Research Department, Chicago House of Correction. Bulletin No. 1. July, 1915. 14 pp.

A brief account of the attempts that are being made in this department to make an individual study of the conditions that have led to the commission of anti-social acts on the part of offenders sent to the House of Correction. The present plan consists largely of an extended interview with questioning and a series of mental tests on the basis of which the institutional treatment is adjusted. The pamphlet also sketches plans that are in mind for future developments in this work, with special reference to diagnosing the mental status of those committed to the institution.

HELEN MACMURCHY, M. D. *Organization and Management of Auxiliary Classes*. Department of Education, Ontario. Educational Pamphlets, No. 7. 1915. 212 pp.

This paper-covered pamphlet is really a book, and a very excellent one, upon the problem of special classes for the mentally and the physically defective. Its eight chapters have primarily in view the situation in Ontario, but the treatment is by no means restricted and official in tone. The chapters deal with the need for such classes, sketch the history of the movement for special classes in Europe and America, discuss the qualification and training of teachers, describe the equipment of the classroom, outline a course of study and indicate the probable cost. In the several appendixes will be found advice to parents of defective children, an extended account of the work done in Philadelphia Special Classes and an excellent bibliography. There are a considerable number of diagrams and photographic illustrations and a good index. We commend this pamphlet to those dealing with special class education.

The Measurement of Efficiency of Schools Established for the Deaf—Age, Grade and Progress Norms, Mentality Tests, etc. Indianapolis: State School for the Deaf, 1914. Pp. 24.

Among points considered by the committee were the mental, physical, and moral conditions of the pupils, the arrangement of the curriculum, the quality of the teaching force, progress of pupils, supervision, independence and self-containment of the pupils, equipment and environment of the school, and results as demonstrated in the after life of pupils. The following are put down as the most important criteria of success: teaching power, including the training of the pupils in how to study, preparation of the lesson, and skill in pre-presentation, government and personality. The pamphlet also discusses eugenics and euthenics, tests and standards of efficiency, the Binet-Simon scale, and gives a brief bibliography of good books and articles on the subject.

BENJAMIN W. MITCHELL. *The Writing of Narrative Latin*. Cincinnati: American Book Company, 1915. Pp. 226.

From the selections and exercises given it is hard to see much difference between this so-called narrative Latin and the old fashioned prose composition where isolated sentences are changed into Latin.

WILLIAM C. MOREY. *Ancient Peoples*. Cincinnati: American Book Company, 1915. Pp. vi, 634.

A study of the history of mankind from the earliest oriental civilization through the Greeks and the Romans to the rise of the Germans in the west, and the crushing of the Empire by the Ottomans in the East. The book is well gotten up and admirably illustrated.

JOHN LOVETT MORSE AND FRITZ B. TALBOT. *Diseases of Nutrition and Infant Feeding*. New York: The Macmillan Company, 1915. Pp. ix, 346. \$2.50.

"This book was written to meet what seemed to the authors two distinct needs in American pediatric literature. A detailed description of the scientific basis of rational infant feeding and a description of the methods of infant feeding taught in the Harvard Medical School." The topics of the book are Physiology and Metabolism, Breast Feeding, Artificial Feeding, Diseases of the Gastro-Intestinal Canal, and Diseases of Nutrition. There are profuse citations to original contributions on the subject, and one is left with the impression that here is a genuinely scientific work, and not the ordinary doctor's book for mothers. At the same time the style is not unnecessarily complicated and the argument can be read and comprehended by any intelligent, educated person.

SHILO SHAFFER MYERS. *School Music Reader*. Cincinnati: American Book Company, 1915. Pp. 175.

The author presents this as a complete course in vocal music for rural and village schools and graded schools in which music has not previously been taught. Attention is directed to rhythmic exercises and to ear training. The selections for part singing are chiefly old and familiar popular melodies.

LOUISE ELLISON ORDAHL AND GEORGE ORDAHL. *Qualitative Differences Between Levels of Intelligence in Feeble-Minded Children*. Journal of Psycho-Asthenics Monograph Supplements, Vol. 1, No. 2, June 1915. Pp. 50.

Ten cases were selected from each of three groups of children whose mental ages were six, eight, and ten as determined by the Binet-Simon Scale. Each of these groups was given fifteen tests as follows: dynamometer, judgment of movement, simple reaction to sound, tapping tests, attention span, discrimination of grays, judgment of forms (two dimensions), judgment of form (number two), judgment of size, judgment of form (three dimensions), memory for geometrical forms, modified typewriting, ink-blot test, drawing of designs inverted, and comprehension of complex directions. The results for each of these tests are given separately and norms for each of the different mental ages are drawn up. There was a noticeable lack of energy and capacity for voluntary effort on the part of the feeble-minded. All are weak in degree, duration, and span of attention. The monograph is an interesting and valuable piece of work.

RUDOLF PINTNER. *The Standardization of Knox's Cube Test*. Reprinted from the Psychological Review, Vol. 22, No. 5, Sept. 1915, 377-401.

The author believes that the Knox Cube Test is a valuable aid to the diagnosis of the degree of mental defect. The test has been given to 867 normal children and 463 feeble-minded. The author finds it impossible to lay down any definite percentages for the standardization of the test. The curves of feeble-minded children follow those of the normal children closely, generally remaining a little below. The author thinks that we have been too ready to avoid hard work and that, therefore, present attempts at the solution of the problems of standardization are inadequate. Only by a thoroughgoing treatment of each and every test will we ever arrive at tests that will give us something more than a mere approximation to a child's mental age.

Report of the Commissioner of Education for the Year Ended June 30, 1914. Bulletin No. 645. Washington: Bureau of Education, 1915. Two volumes. Pp. xxxviii, 810, xxv, 565.

The present report of the Commissioner of Education maintains the high standard expected of this "year-book of American education," and contains several new features which add materially to its excellence. Of especial interest to educational psychologists are Dr. Strayer's discussion of the "Adaptation of Schools to the Varying Capacities and Needs of the School Population," Superintendent Van Sickel's account of "School Surveys and School Supervision in Larger Cities," a new section on "School Progress in Smaller Cities," Mr. William T. Bawden's presentation of "Progress in Vocational Education," Miss Almira M. Winchester's chapter on "Kindergarten Progress," Miss Anne E. George's account of "The Montessori Movement in America," and a chapter on "School Surveys" by Edward B. Buchner, giving an epitome of all the important surveys to date.

Second Annual Conference on Educational Measurements held under the Auspices of the Extension Division of Indiana University, April 16 and 17, 1915. Indiana University Bulletin, Vol. 13, No. 11, October, 1915. Pp. 221. Fifty cents.

At this conference the speakers from abroad were S. A. Courtis, director of the department of educational research, Detroit, Mich., and Leonard P. Ayres, director of the division of education, Russell Sage Foundation. Mr. Courtis gave addresses on Supervisory Control by Means of Objective Standards, Limitation of Training, and Educational Diagnosis; Dr. Ayres spoke on Making Education Definite, The Measurement of Educational Processes and Products,

and A Survey of School Surveys. Other important addresses were those by M. E. Haggerty on Co-operative Research from the View-point of the University, and by Earl Hudelson on Standards and Measurements in English Composition. The latter paper discussed the application of the Ballou Scales in English composition to 386 pupils of the seventh, eighth, and ninth grades. The ratings with and without the scales showed little difference in results.

ANNA TOLMAN SMITH. *Secondary Schools in the States of Central America, South America, and the West Indies: Scholastic Scope and Standards*. Bulletin No. 653. Washington: Bureau of Education, 1915. Pp. 40.

The monograph gives some idea of the reconstruction of educational ideals that is taking place in the states of Central and South America under the pressure of economic and industrial developments.

Special Report of the Boise Public Schools. Boise, Idaho; 1915. Pp. 96.

This report is in the nature of a valedictory from Superintendent Meek, who after seven years of service leaves Boise to take charge of the schools of San Antonio. Interesting features of the report are a study in retardation and acceleration, an investigation of English usage and the mechanism of English, results of the use of the Courtis Standard Tests in Arithmetic, Series A, industrial education, and the co-operation of the community with the public schools.

Statistics of Certain Manual Training, Agricultural, and Industrial Schools, 1913-1914. Bulletin No. 644. Washington: Bureau of Education, 1915. Pp. 79.

Represents a praiseworthy effort to secure reliable information on what is actually being done in industrial education in different parts of the country.

JOHN LINCK ULRICH. *Distribution of Effort in Learning in the White Rat*. Behavior Monographs, Vol. 2, No. 5, 1915. New York: Henry Holt & Co., 1915. Pp. 51.

The essential problem here is to discover the most economical method for rats to learn to get out of the latch box, the maze, or the inclined plane box—one trial, three trials, or five trials per day. In conformity with the results of experiments in human learning, distribution of repetitions is found more economical than bunching them, *i. e.*, one trial per day is more economical than three or five. Indeed, one series of tests showed one trial every third day to be the most economical. The same principle holds whether each problem is learned singly or the three problems are learned abreast.

CHARLES W. WADDLE AND WILLIAM T. ROOT, JR. *A Syllabus and Bibliography of Child Study, with Special Reference to Applied Child Psychology*. Bulletin of the Los Angeles State Normal School, August, 1915. Pp. 98.

An excellent outline of the somewhat inchoate mass of material referred to under the name of child study. The titles of the six sections are Introductory and Historical, Physical Growth and Hygiene, Biological Perspective and Instincts, Activities with an Instinctive Basis, Child Psychology, and Types Varying from the Normal-Mental Tests. The outline of each topic is followed by a carefully selected working bibliography. The syllabus represents the most successful attempt yet made to organize this material, and it is hoped that the authors will immediately expand it into a systematic textbook.

E. J. WARD. *The Schoolhouse as the Polling Place*. Bulletin No. 638, Washington: Bureau of Education, 1915. Pp. 25.

Arguments for and examples of the successful use of the schoolhouse as a polling place. It fosters the civic spirit of the community, and trains the school children in the highest activity of citizenship.

HENRY T. WEED. *Chemistry in the Home*. Cincinnati: The American Book Company, 1915. Pp. 385.

This admirable little manual will introduce young people to the simpler and more familiar aspects of chemistry, and will arouse a desire to know more about the subject. While intended for pupils who elect chemistry early in their high school course, it might be used to advantage in the upper elementary grades.

THE JOURNAL OF EDUCATIONAL PSYCHOLOGY

A CLASS TEST WITH DEAF CHILDREN

RUDOLF PINTNER AND DONALD G. PATERSON

Ohio State University

The collection of norms for various ages for certain class tests by Pyle in his "Examination of School Children" is proving valuable for comparative purposes with other groups of children. The writers have given the Digit Symbol Test as a class test to 325 pupils in a school for the deaf,¹ and they have used Pyle's norms as a basis for comparison. This test is primarily a performance test in as much as it does not depend upon language, and therefore we feel that the results are directly comparable with those of hearing children. The question of language, which is such a stumbling-block to the deaf, does not here enter into account.

Pyle's procedure in giving this test is to read out the following directions to the class: "In the circles at the top of the sheet before you are written the nine digits and nine symbols which are to be written in the blank squares below for the digits to which they correspond. Work as fast as you can and try to fill as many of the squares as possible without making mistakes."

We felt that if these directions were written upon the board many of the deaf children would not comprehend what was wanted because of their difficulty in comprehending language, and so we adopted another method. This consisted of drawing

¹ The writers wish here to acknowledge the kindness and courtesy extended to them by Mr. J. W. Jones, Superintendent of the Ohio State School for the Deaf. The substance of this paper was presented to the Committee on Efficiency of the Conference of Superintendents and Principals of American Schools for the Deaf at the meeting held in Columbus, April 13, 1915.

on the blackboard the nine circles with the digits and symbols as they appear on the test sheet. Then samples of two rows of digits were written below the circles. We went through the process of filling in the first blank. Then a child was called to the board and shown how to do it. By this time many of the class understood what was wanted. We next picked out any who seemed not to understand this procedure. In some of the lower grades as many as half the class had their turn at the board until they understood the directions. Then the class was asked if everyone understood. If so, the sample was erased and the test sheets passed around. The examiner held up the sheet and pointed out the circles, the digits, and the blanks, so that the pupils knew what they were to do. The pupils were then required to hold their pencils in the air and at a signal they all started to work. Often some were urged to continue working when their attention seemed to wander. Eight minutes were allowed in grades below the first intermediate, and five minutes for the higher classes. We feel that the conditions governing the test were fair to the pupils. The advantage was certainly on the side of the deaf child as compared with the way in which the test has been given to the hearing child.

We gave the test to all the classes in the school, with the exception of one second primary class and all classes below that. We felt that it would be useless to attempt the test with these lower classes and the results have confirmed our opinion.

The tests of each class were recorded as a class and our records show (1) the name of each member of the class, (2) the age, (3) the score, (4) the age of the hearing child to which this score corresponds (Pyle's norms were used here), (5) the number of years retarded or accelerated (this was obtained by subtracting (3) from (4) or vice versa) and (6) the index, *i. e.*, the ratio of this score to fifty, Pyle's norm for the age in question being put equal to fifty. Fifty would then mean that the two were the same. For each class the median score was selected as the score of the class. The median index stood also as the class index, while the median acceleration or retardation indicated the class standing in terms of years retarded or accelerated.

Manual classes were separated from oral classes and Table I shows the class standing for the oral and manual methods of instruction respectively.

TABLE I

ORAL CLASSES				MANUAL CLASSES			
Class	Years Retarded	Median Score	Pyle's Index	Class	Years Retarded	Median Score	Pyle's Index
2d Prim.	3.0+	0.0	0.0	2d Prim.	5.0	7.7	17.0
3d Prim.	3.0	11.5	30.0	3d Prim.	9.0	4.1	7.5
4th Prim.	2.0	15.2	37.0	4th Prim.	3.0	15.2	36.0
5th Prim.	2.5	20.0	38.5	5th Prim.	4.5	16.1	33.0
1st Inter.	2.5	22.2	45.0	1st Inter.	5.5	18.0	34.5
2d Inter.	2.5	21.0	42.0	2d Inter.	4.0	20.6	40.0
3d Inter.	2.0	23.8	43.0				
4th Inter.	3.0	23.0	42.5	4th Inter.	2.0	23.4	46.5
5th Inter.	0.0	27.0	47.5	5th Inter.	5.0	24.4	42.0
Junior High	0	29.6	51.5				
Senior High	0	31.4	51.0				

A glance at this table shows us how each higher grade as a rule increases in learning ability over the lower grades. The index is also interesting as it shows that the more advanced the class the closer it approaches the normal, *i. e.*, fifty. The two high school classes are slightly above normal. This means, we take it, that in the higher classes the best pupils tend to be found, the poorer ones dropping by the wayside, remaining in the lower grades. We can compare the performance of oral and manual classes by the median score in each case. It will be seen that at all grades, with the exception of the second primary, the median score for the oral classes is higher than that of the manual classes. Among the oral classes it is seen that the second and fourth intermediate grades show a decrease in ability from what would be expected. It may be that in these two grades there are a relatively greater number of retarded pupils which would tend to produce the recorded results. If this same tendency were found when other class tests are given, this conclusion might be justified. The oral classes again show a higher index in most cases, *i. e.*, they are nearer what they ought to be than are the manual classes. In no case, however, does any class reach fifty.

In Table II we have separated the manual pupils from the oral pupils and then recorded the results for each chronological age. Reading horizontally across the table we find the various

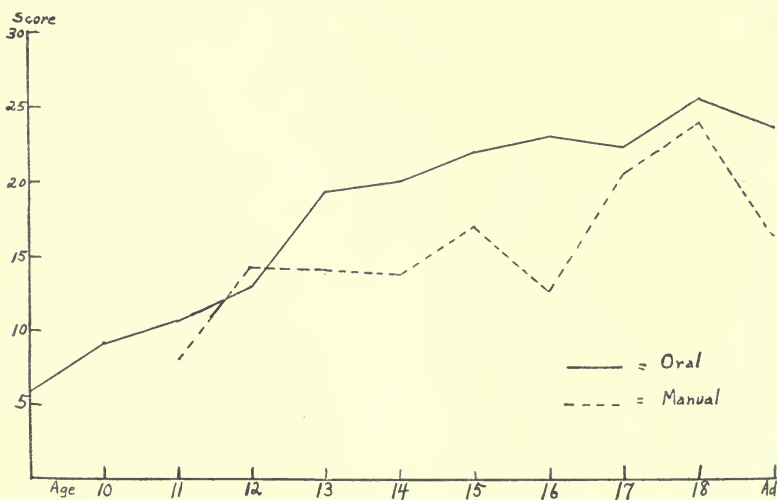
TABLE II
Oral Pupils

Age	9	10	11	12	13	14	15	16	17	18	over 18	Total
Number.....	6	24	21	20	24	12	17	27	12	10	8	181
25% Quartile.....	12.9	13.6	12.5	15.0	21.6	20.8	24.6	26.2	27.6	29.8	28.8	
Median.....	6.0	9.2	10.8	13.0	19.4	20.0	22.0	23.0	22.4	25.6	23.6	
75% Quartile.....	0	0	0	8.3	15.0	12.8	16.6	21.0	18.2	17.2	17.0	

Manual Pupils

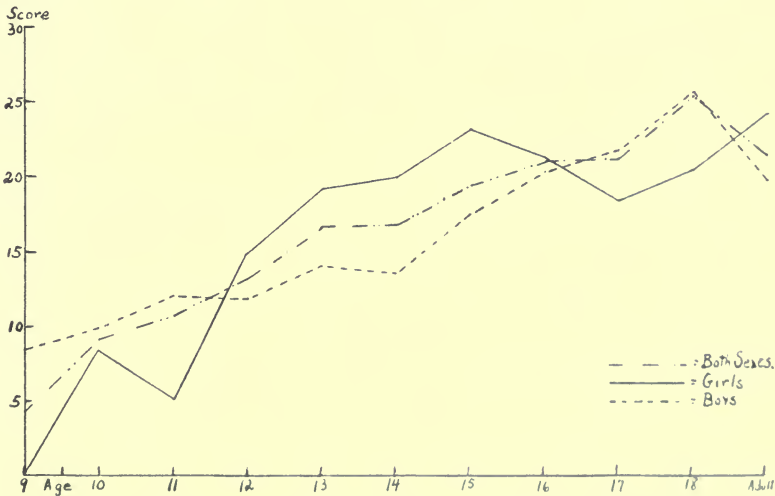
Age	9	10	11	12	13	14	15	16	17	18	over 18	Total
Number.....	14	13	11	11	13	24	29	12	17	144
25% Quartile.....	15.3	16.5	15.2	21.9	25.0	22.0	25.0	26.0	20.8	
Median.....	8.1	14.3	14.1	13.8	17.0	12.8	20.6	24.0	16.4	
75% Quartile.....	0	11.9	7.7	4.1	13.8	8.9	12.3	18.2	8.5	

chronological ages. In the second horizontal column is given the number tested; in the third the score reached by twenty-five per cent. of the cases; in the fourth the median; and in the fifth that reached by seventy-five per cent. of the cases. Similarly the results for the manual pupils are recorded below. Graph I represents the median ability of the manual and oral pupils.



GRAPH I.—Comparison of the scores of deaf children, taught by the oral and manual methods respectively, grouped according to age.

This curve shows that there is a constant increase in ability with the oral pupils from age to age with the exception of the seventeen year olds, who make a slightly poorer showing than the sixteen year olds, and again those over eighteen years do worse than the eighteen year olds. The curve is, in fact, fairly regular. This is not the case with the manual pupils. Their curve is irregular, no gain being registered from age twelve to age fourteen. There is a jump at fifteen and then a decided falling off in ability at sixteen. Those over eighteen are decidedly poorer than the eighteen year olds. This curve indicates that the manual pupils are not uniform in their ability from age to age, due probably to an irregular distribution, among the total number of manual pupils, of decidedly retarded pupils. This is borne out by observing that the oral pupils, with the exception of age twelve, are throughout much superior to the manual pupils, indicating that for oral work the brighter pupils are selected. We do not mean to say that every manual pupil is duller than the oral pupil, but the results seem to indicate that ability to profit by the oral method correlates rather highly with general mental ability.

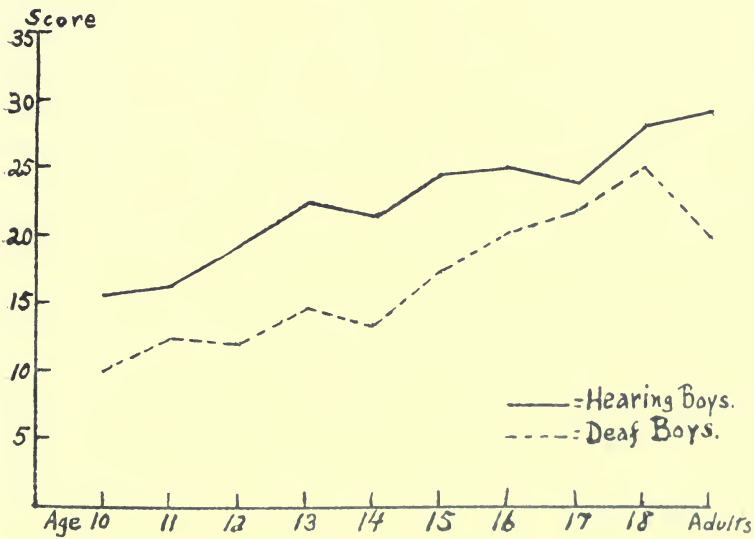
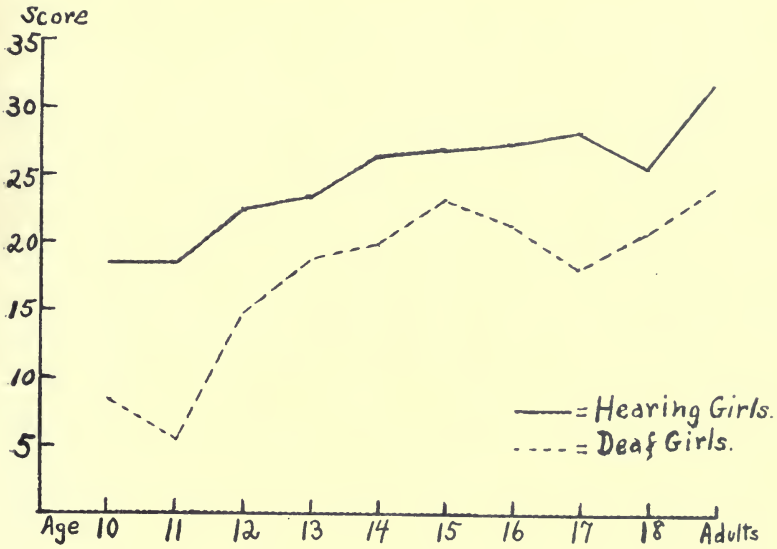


GRAPH II.—The median score for each chronological age.

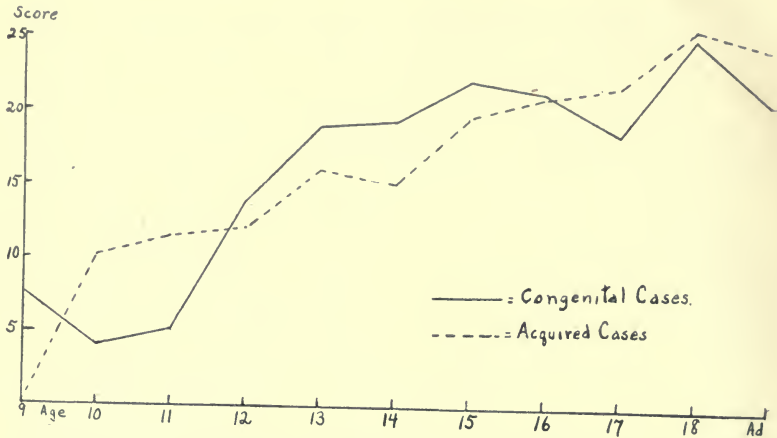
Graph II shows the curve of the medians for all the deaf children taken together, and also the curves for the boys and girls taken separately. The curve for all the pupils is now fairly regular. The inequalities of the curve for manual pupils have more or less disappeared. The sharp decline at the end for those over eighteen is, of course, still prominent. This is, no doubt, due to the fact that those of average ability go through school and finish at or before eighteen, and only those who are dull remain two or three years longer. The other two curves give us the comparison between deaf boys and deaf girls. Up to age twelve the boys are superior, between twelve and seventeen the girls are superior, at ages seventeen and eighteen the boys are again superior, while deaf girls over eighteen are superior to the boys over eighteen. For normal hearing children there is a significant and more or less constant sex difference, the girls throughout all ages being superior. We may say then, that sex differences are not so evident among the deaf, and this may be due to the fact that they do not represent a normal sampling of the two sexes, other factors such as heredity and disease entering in to overcome the sex differences at various parts of the curve.

Graph III shows the median scores for each chronological age for deaf as compared with hearing boys, and for deaf and hearing girls. The curves for the hearing boys and girls have been constructed from Pyle's figures. It will be seen that at no age does the curve for the deaf reach the curve for the hearing. At some ages it is very much below. The irregularity of the curve for deaf girls is very marked.

The deaf can be divided into two groups from the standpoint of the cause of their deafness, i. e., congenital and acquired. The reliability of the ordinary causes assigned by parents is not very high and the school records give little more than the cause as assigned by the parent. We feel that many cases put down as due to sickness or disease in early childhood may well have been congenital, and probably the number called congenital is underestimated. There were 143 congenital and 204 acquired cases, and these were fairly evenly distributed over the ages from ten to seventeen. Graph IV shows the median ability for the two types of deafness at each chronological age. The curves keep so close together and cross each other so often as to allow of no definite conclusions. We cannot say that the congenital are



GRAPH III.—Comparison of hearing and deaf children.



GRAPH IV.—Comparison of congenital and acquired cases of deafness.

superior to the acquired or vice versa. There seems to be on this test no radical difference in ability between the child who is congenitally deaf and the child who becomes deaf after birth.

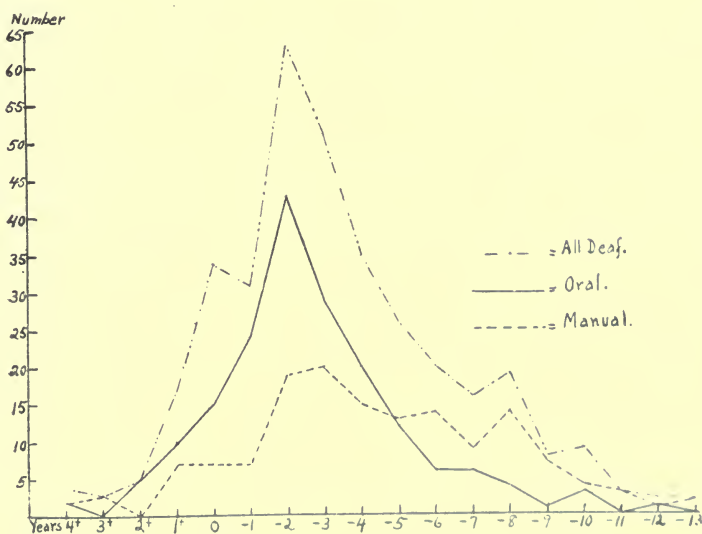
How many years retarded or accelerated is the average deaf child in regard to his learning ability as measured by this substitution test? Our method of answering this question was as follows. We had every individual's record as to his retardation or advancement, using Pyle's norm as the standard for each age. We then calculated the number of years retarded or accelerated for each child. Table III gives the number of children who are retarded or accelerated one, two, three years and so on.

This is shown for the manual and oral pupils separately and then for all the deaf pupils combined. Here again we find the manual pupils showing more retardation than the oral pupils. The average retardation for the different groups is interesting. The oral pupils are on an average two years retarded while the manual pupils are four years retarded. All the deaf pupils combined, to which have been added twenty High School pupils, show a retardation of three years.²

² This same amount of retardation was arrived at from an entirely different source by the authors in their article, *The Binet Scale and the Deaf Child*, Journal of Educational Psychology, Vol. VI, 4. April, 1915.

TABLE III

Years accelerated or retarded	MANUAL PUPILS			ORAL PUPILS			ALL DEAF PUPILS		
	Number	Percentage of Total	Percentage of Groups	Number	Percentage of Total	Percentage of Groups	Number	Percentage of Total	Percentage of Groups
+4	2	1	3.0	2	1	3.7	4	1	3.4
+3	3	2		0	0		3	1	
+2	0	0		5	2.7		5	1.4	
+1	7	5	15.0	10	5.5	26.8	17	5	23.7
0	7	5		15	8.3		34	9.7	
-1	7	5		24	13.0		31	9	
-2	19	13	26.5	43	23	39.0	63	18	32.6
-3	20	13.5		29	16		51	14.6	
-4	15	10		20	11		35	10	
-5	13	9	55.5	12	7	29.6	26	7.4	40.3
-6	14	9.5		6	3.3		20	6	
-7	9	6		6	3.3		16	4.6	
-8	14	9.5		4	2.2		19	5.4	
-9	7	5		1	0.6		8	2.3	
-10	4	3		3	1.6		9	2.6	
-11	3	2		0	0		3	1	
-12	1	0.5		1	0.6		2	0.5	
-13	2	1		0	0		2	0.5	
Totals...	147	100	100	181	99.1	99.1	348	100	100



GRAPH V.—Distribution of deaf children in terms of years retarded or accelerated.

Graph V shows the distribution of cases for all the deaf and for the oral and manual separately arranged according to the number of years retarded or accelerated. If we call those more than one year accelerated supernormal, then we have 3.4 percent of the deaf pupils supernormal. There are 23.7 percent who may be considered equal to the average hearing child. These show just the same ability as the hearing child or test merely one year advanced or retarded. There are 32.6 who may be termed backward, that is from two to four years behind the normal hearing child. That leaves an unexpectedly large group of 40.3 per cent. who are over four years retarded. These we may term dull. Among this group there are no doubt many feeble-minded, but we would not be warranted in drawing any such definite conclusions from the results of one test alone. An inspection of the group percentages for the oral and manual pupils taken separately shows a much larger percentage of the dull group among the manual pupils, a fact that is to be expected in the light of the previous comparisons of these two groups.

The results of this test seem to the writers to show the possibility of using class tests to compare in a general way the ability of different groups of individuals considered as groups. For a preliminary survey of an institution or school several class tests, for which reliable norms for comparative purposes exist, would seem to be excellent.³

³ Since the above article was written, the writers have extended the scope of this work to include about one thousand cases and have used both the Digit-Symbol and the Symbol-Digit Tests. This work appears in the *Psychological Review Monographs*, Vol. XX, No. 3, Whole No. 87, under the title, "Learning Tests with Deaf Children."

PRESENT TENDENCIES IN EDUCATIONAL PSYCHOLOGY

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In the minds of many the claim that education as a college subject is to be termed a science is at present insufficiently supported. Many honestly believe that education in the very nature of things cannot become a science. Exact measurements of mental processes are quite impossible, and without such exactness "science" is a misnomer. If, however, one defines science as truth inductively investigated and carefully organized for the purpose of discovering and stating fundamental laws, then education has the right to this title, for this is exactly what is being attempted, especially in that branch of education called educational psychology. Once a smattering of *a priori*, philosophical theory and emotional exhortations based on traditional viewpoints—themselves the results of points of view held by prominent thinkers—education today is struggling away from untested authority into the laboratory where testing, investigation, experimentation are the main if not the only grounds adequate for educational theory and practice. Granting that at present much of this laboratory work is inexact and subject to constant revision, and admitting also that mental phenomena elude absolutely exact measurements, credit should be given for the conscientious attempts made to ascertain as accurately as present apparatus permits what are the laws of learning and how the educative process can best be realized in a reconstructed system of education. The modern point of view in education seeks to be scientific, *i. e.*, open-minded and receptive to demonstration and observation of enumerable cases or subjects. If the results are unsatisfactory this is doubtless inevitable even in those sciences called exact. Constant revision is the key-note of true science.

What is true of education in general has been true also of its closest ally, namely psychology. In many quarters psychology remains in the philosophical group. Teachers of philosophy are loath to agree to a breaking of partnership with this subject of psychology dear to Plato. On the other hand, psychologists who have succeeded in starting business for themselves, as it were, are equally unwilling to grant that *educational psychology* deserves independence. To classify psychology into eight or nine subgroups as is now customary seems after all to be purely arbitrary and convenient only for administrative purposes. Essentially there is only a difference of the field of application, and references to these various fields can be easily and adequately made in general psychology. To call educational psychology a distinct discipline or science is therefore looked upon by many as arrogant presumption.

But the fact that education forms one of the many fields of specific application of psychological truth and one of the most significant in the life of individuals and nations is reason enough to emphasize educational psychology as worthy of a distinct title. For this particular phase of the "science of mind" or of "behavior" deals with a select group of processes, and specialization is necessary, for the sake of economy of time at least, to investigate and organize the data here available. It is fundamentally important that experiments be made throughout the entire field of education. The problems of the school room and of the learner are peculiar to these phases of society. Experimental pedagogy is just as important and just as possible as experimental farming. Agriculture is distinct from biology and botany and chemistry but as a science it depends on data from all of them. Educational psychology is distinct from general psychology, biology, history and philosophy but it uses data from all of these departments of learning and in addition seeks to demonstrate in mathematical terms or graphs the results of investigations carried on in the school or under conditions similar to the school. The task is indeed herculean. Men like Meumann, Thorndike, Bagley and Whipple loom large in its evolvment.

But educational psychology, because a young science, is still insufficiently organized. There does not seem to be a general agreement as to its contents as over against the delimitations of

psychology in general. College and university courses in the subject are still largely the result of personal preferences on the part of the teacher in charge. Terminology is still confused. In order to ascertain the present tendencies as accurately as possible a questionnaire was sent to all of the teachers of educational psychology included in the membership of the Society of College Teachers of Education. The questions in the main asked for information on the following points:

1. Name of course, with number of semesters offered, principle method of teaching it, prerequisites, seminars offered, enrollment and name of authors and texts used in the respective courses.
2. Distinctly pedagogical laboratory equipment available.
3. List of sub-topics stressed in the courses taught.
4. Other subjects taught by teachers of educational psychology.
5. Conceptions of standard courses in this field and suggested minimum requirements, including specific prerequisites, for entrance upon courses in educational psychology.
6. Problems investigated in the seminar courses.

The questionnaires were filled out by fifty-three professors. Replies stating inability to supply the information requested or that no special courses in this subjects were offered came from fourteen. In all sixty-seven replies were received. The author takes this opportunity of acknowledging the courtesies shown him in this preliminary survey. Many of the correspondents evinced keen interest in the attempt to ascertain what is now being done in this subject and many expressed the hope that some definite effort might be realized for systematizing and standardizing educational psychology.

The foregoing subjects in some cases, as "Social and Moral Education," are not strictly psychological but they were so reported.

At Teachers College, Columbia University, courses in educational psychology include methods of teaching in special classes, supervision of special classes, observation, experiment and teaching in connection with special classes, psychology of childhood, psychology and treatment of exceptional children, applications of experimental and physiological psychology to education, educational psychology, psychology of the elementary

A. TENDENCIES AMONG COLLEGE AND UNIVERSITIES

TABLE I.

Names of Courses in Educational Psychology

General Educational Psychology.....	45	Principles of Method for High School Teaching.....	2
Advanced Educational Psychology....	5	Criticism and Supervision of Teaching	1
Genetic Psychology.....	16	Literature of Educational Method....	1
Mental Tests.....	17	Modern Methods in Elementary Schools	1
Child Psychology.....	4	Psychology of Learning.....	1
The Learning Process.....	3	Method.....	1
Deficient Children.....	3	Psychology of Elementary Subjects..	2
Principles of Teaching.....	1	Psychology of Elementary Subjects..	1
Psychology of Adolescence.....	1	Principles of Education.....	3
Logic of Education.....	1	Practice Teaching.....	2
Social and Moral Education.....	1	Onthogenics.....	1
Elementary Educational Psychology..	1	Eugenics and Euthenics.....	1
Mental Processes.....	1	Retardation and Elimination.....	1
Individual Psychology.....	1	Lecture Course on Memory Process..	1
Psychology for Normal Teachers....	1	Lecture Course on Reasoning Process	1
Laboratory Courses.....	6	Problems of College and University..	1
Statistical Methods.....	2	Various Seminar Courses.....	8
Experimental Education.....	7		
Principles of Method for Elementary Teaching.....	1		

subjects, psychology of the secondary school subjects, application of analytic and genetic psychology to education, application of psychological and statistical methods to education, clinical psychology and courses in statistical methods.

The foregoing lists will be better understood after noting the sub-topics stressed in some of the courses.

TABLE II.

SUB-TOPICS IN EDUCATIONAL PSYCHOLOGY

The Learning Process.....	11	Mental Tests.....	4
Memory.....	11	Individual Differences.....	6
Fatigue.....	7	Perception.....	3
Instinct.....	8	Transfer of Training.....	3
Attention.....	5	Reason.....	5
Habit.....	8	The Original Nature.....	4
Imagination.....	6	Correlation.....	3
Association.....	5	Psychology of special subjects.....	3

The following sub-topics are mentioned only once: Mental and Physical Hygiene, Feeling, Acquisition of Musical Skill, Physical Development, Work, Dependence of Mind on Body, Child Development, Play, Retardation, Conception, Volition, Suggestion. Sub-topics in general psychology as emphasized in connection with education and mentioned once by the respective correspondents are Infancy, Periods from the Standpoint of Neural Development, Play, Instincts, Animal Psychology, Child

up to School Age, Development from Infancy through Adolescence, Growth of Mental Power, Heredity, Individual Differences, The Learning Process, Abnormalities, Fatigue, Physical and Mental Development, The Abnormal Boy, Growth and Function, Development of Intellect, Development of Instincts, Application of Tests, Organic Evolution and Development, Mental Evolution (animal and human), Sensation, Expression, Control, Social Psychology, Sensory Discrimination, Memory and Memory Images, Evidence of Reasoning, Evidence of Consciousness, Child Study, Development of Special Functions, Social and Moral Development.

The main courses offered under the general title of educational psychology stress the following sub-topics. *Experimental Pedagogy*—psychology of testing, technique of Binet tests, new tests, elementary school subjects, educational measurements, study of inductive literature of psychological processes involved, testing results. *Advanced Educational Psychology*—individual differences, mental inheritance and correlation, original nature of man, psychology of learning, social psychology. *Experiments in Educational Psychology*—Starch's Manual, acquisition of habits, memorization, association, intellectual tests, economics of learning, types of learning. *Mental Tests*—Retardation, Binet Tests, mental and physical tests, defective and exceptional children, Whipple's Manual, perception and reasoning. *Logic of Education*—Psychology of attention, interest, thinking, age differences and development, individual differences. *Social and Moral Education*—Psychology of character, age differences and development, application of pedagogical method.

Seminar Course in Educational Psychology are being devoted to research in the following fields: attention, individual differences, Binet tests each year in the elementary school, mental levels, practice error in short hand, principles of marking pupils, scales, the learning process, moral deficiency, school processes, fatigue, mental deficiency, blood pressure, locomotive guidance, adolescent psychology, border cases, psychology of secondary subjects, educational measurements, mental tests, effect of the Curtis practice series in arithmetic, coefficients of correlation, attention in advertisements, operation of secondary laws of association, how students study, endowments, peditaries, applicability of standard tests, practice effect of learning, eye movements,

standardization of school and mental tests, criticism of mental and physical development, age standards in mental tests, study of "opposite" tests, completion tests, age standards in writing, retardation and elimination.

The foregoing survey, while lacking in completeness, embraces forty of the institutions offering courses in educational psychology in this country. One observes considerable confusion in terminology, courses doubtless similar in content bearing titles quite dissimilar. The subtopics are distributed according to the individual instructors' conception of the course. There seems to be lacking a universal agreement on the contents of educational psychology in general or any of its large branches in particular. The field is defined arbitrarily and titles are used as labels for "all-spice" courses. But from this mass of topics it may be worth while to state the following

Summary—Educational psychology as now taught in the colleges and universities of this country embraces chapters on the learning process with special emphasis on memory processes included under various terms and involving association, perception, imaging, attention and to a less degree chapters on the higher thought processes of thinking and reasoning. Considerable time is devoted to the study of mental development by stages or by age. The original nature of the individual including endowments, instincts, capacities with habit formation is given considerable attention, and is adding to the significance of the doctrine of individual differences. This study of normal endowment is supplemented by courses on defective and exceptional children with the intimately related problem of retardation. No small amount of time and effort is devoted to the psychology of school subjects and the application of its principles in supervised methods of teaching. The numerous courses on statistics evince a growing tendency to reach as high degree of accuracy in measuring and stating results as may be possible in this type of scientific work. One senses throughout the confusion of titles and terminology a wholesome movement toward a well defined field of investigation and the possibility of eventually standardizing the general conception of educational psychology.

B. ADMINISTRATION OF COURSES IN EDUCATIONAL PSYCHOLOGY

TABLE III.

Others Subjects taught by instructors in Educational Psychology

Philosophy.....	10	Comparative Psychology.....	1
Logic.....	1	Hygiene of Instruction.....	1
Ethics.....	4	School Administration.....	2
History of Education.....	9	School Hygiene.....	3
Psychology.....	9	Education.....	4
Secondary Education.....	2	Applied Psychology.....	1
Education in U. S.....	1	School Management.....	1
Principles of Education.....	3	Philosophy of Education.....	2
Pedagogy of High School Subjects....	2	Adolescent Psychology.....	1
Genetic Psychology.....	1	Educational Theory.....	2
Experimental Pedagogy.....	1	Primary Education.....	1
General Methods.....	3	Psychotherapy.....	1
Experimental Psychology.....	4	Educational Sociology.....	1

In seventeen institutions the "professor of education" is a distinct chair, in twenty-eight the chair is not distinct.

It should be noted that in the table the subjects taught in addition to educational psychology are very closely related to this field. Philosophy still claims education as its own in fifteen of the institutions replying. The groupings in the table are, it would seem, quite logical and the additional subjects might well serve as fields of applied educational psychology in which the principles of the main subject may receive concrete and vital illustration and realization in reformed methods.

Prerequisites.—There is a strong tendency to make general psychology a prerequisite to courses in educational psychology, thirty institutions still making this requirement. In this connection the comments of three or four professors in educational psychology are significant. Professor Colvin writes:

"A course in general psychology is desirable though not absolutely necessary. Prerequisites in education are not as a rule necessary though local conditions may make them desirable."

Other comments are more strongly opposed to prerequisites in general psychology as now taught. Professor Kohl says:

"General psychology should be a prerequisite but I am not so certain that it counts very much as usually given with the emphasis so much on sensation and the nervous system. I am feeling more and more that a vital course in biology would be a greater help."

Professor V. A. C. Henmon writes:

"I have a feeling that there would be a gain if those who intend to take educational psychology should take general psychology in the department of educational psychology. A better articulation of the work would result."

Professor Chase of the University of North Carolina writes:

"It is my good fortune to teach elementary psychology as well as the educational psychology. I do not believe, however, that the two courses can be fused and was very much surprised to see in some of the replies published this month (March) in the *Psychological Bulletin* that a number of teachers were in favor of such a union. Pure psychology and educational psychology, to my mind, require different methods of treatment, different subject matter, different points of view. The approach must be different, as must be the approach to pure and applied science anywhere. I have wrestled with the question whether pure psychology should be required as a prerequisite for educational psychology and have finally come to the conclusion that it should not."

The suggestion that courses in biology be substituted for prerequisites in pure psychology deserves careful consideration. The chief advantage in pursuing the latter lies doubtless in the acquaintance offered the student with terminology and general contents of psychology. The same advantage, however, results from a well organized course in educational psychology if care is taken to explain terms clearly and without too much reference to the many theories concerning psychological terms. Confusion results frequently when students of pure psychology begin the study of education. The point of view is wholly different and it becomes necessary in all too many cases for the student to unlearn what he laboriously tried to glean from the prerequisite course. With the prevailing trend of functionalism or behaviorism in education prerequisites in biology are more essential than general psychology, which all too often is limited to the philosophical or introspective method.

There is a wide range of practice relative to class or semester requirements, but the replies are based on local meanings of administrative terms in many instances, making it difficult to draw conclusions. There seems to be, however, a tendency to require a whole year of general psychology as an introduction to educational psychology. In six institutions experimental psychology is required instead of general psychology. Within the field of educational psychology practically every institution giving information on this point requires general educational psychology as a prerequisite to other courses in this broad field. There does not seem to be a very general requirement that students of methods of teaching have had courses in educational psychology. It is difficult to understand how any teacher can adequately employ correct methods of teaching without knowing something of the underlying principles of the method. Methods

tend to degenerate into mechanical devices and monotonous routine unless consciously evolved from a knowledge of the learning process.

Last year there were offered sixty-one one semester courses, forty-one two semester, two three semester, three one or two semester, one one and a half semester and two six semester courses in the several courses listed under Educational Psychology. Twenty-two hundred and fifty-nine students were enrolled in undergraduate courses and three hundred fifty-six in the graduate department.

Summary.—The administrative phases referred to indicate that at present General Psychology is regarded as the essential prerequisite to courses in educational psychology. Here and there are suggestions that biology take the place of the prevailing prerequisite. Professors of educational psychology teach closely related subjects, but several are still dividing their time with philosophy. One semester courses prevail. The enrollment in undergraduate and graduate courses last year indicates a most encouraging interest in this new science.

C. METHODS OF TEACHING

The following table is not intended to be exhaustive. It simply lists the various texts that are used either exclusively or for reference purposes. Other books are referred to also but these were mentioned as the more important.

TABLE IV. TEXTS USED IN EDUCATIONAL PSYCHOLOGY

<i>Author</i>	<i>Text</i>	<i>Number Using</i>
Colvin.....	The Learning Process.....	11
Thorndike.....	Educational Psychology (Brief Course).....	8
	Educational Psychology, Vol. I.....	3
	Educational Psychology, Three Volumes.....	3
	Principles of Education.....	1
	Mental Measurements.....	9
Pyle.....	Outlines of Educational Psychology.....	6
Bolton.....	Principles of Education.....	5
Sarch.....	Experiments in Educational Psychology.....	4
Parker.....	Methods of Teaching in High Schools.....	4
Kirkpatrick.....	Fundamentals of Child Study.....	4
	Genetic Psychology.....	3
Rusk.....	Introduction to Experimental Education.....	3
Bagley.....	The Educative Process.....	3
Whipple.....	Mental and Physical Tests.....	3
Meumann.....	Psychology of Learning.....	2
Judd.....	Genetic Psychology.....	2
Pillsbury.....	Essentials.....	2
Angell.....	Psychology.....	2
James.....	Talks to Teachers.....	2
Horne.....	Psychology of Education.....	2

The following texts are mentioned once: Henderson, Principles of Education; Ross, Social Psychology; Munsterberg, Psychology and the Teacher; Holmes, Conservation of the Child; Dewey, How We Think; Baldwin, Physical Growth and School Progress; Colvin and Bagley, Human Behavior; Ladd, Outlines of Descriptive Psychology; Kirkpatrick, Individual in the Making; Baldwin, Mental Development; Oppenheim, Development of the Child; Sully, Studies of Childhood; Sandiford, Mental and Physical Life of School Children. Various articles by Woodworth, Hollingworth, and Cattell and Valentine are referred to. Books by Stein and Breitweiser are mentioned but not by titles.

In forty-eight institutions the sole method of teaching mentioned is lecturing. In eleven, lectures and laboratory, in five, laboratory principally. In sixteen institutions there is a well equipped laboratory, including full sets of the Whipple material and Binet tests. Five institutions mention the school system as their laboratory. The lack of laboratory equipment is in itself serious but unless the instructor in charge has had efficient training in the technic of such pedagogical apparatus it probably is better to do without any laboratory whatsoever. Doubtless much harm has been done by inexperienced experimenters attempting to use, for example, the Binet tests. For the present, at least, it seems important to distinguish between the theoretical educational psychologist and the laboratory expert. Eventually the former and the latter should be one and the same person if the subject is to attain its scientific standards.

Summary.—Colvin's The Learning Process is mentioned by eleven institutions and Thorndike's several texts twenty-four times. It probably is unfair to draw any fixed conclusions in this connection but it would seem that last year Thorndike and Colvin texts were used more extensively than other texts in this field. The lecture method prevails. Well equipped laboratories are available in about one-third of the institutions.

D. CONCEPTIONS OF STANDARD COURSES IN EDUCATIONAL PSYCHOLOGY

Replies to this section of the questionnaire cover a wide range of opinion. No two correspondents agree. The reader will

appreciate the problem of standardizing this subject when he glances over the following suggestions:

Should be based on ground work of experimentation and observation. Include applications of instincts, capacities, habits, types of learning—memory, thinking process, feeling with more consideration of experimental results.

Brief introduction to genetic psychology followed by more thorough study of instincts, habit, memory, etc.

One semester of child psychology and one of adolescent psychology.

Consist of laws of mental development and facts related to methods according to which mature mental processes function in educational applications.

Consist of a three hour course in general educational psychology, a three hour course in general psychology and special courses in individual differences with emphasis on psychology of school subjects.

Should cover analysis of the learning process with experimental results gained from experiments in the field of habit, memory, association and imagination.

One year of general and educational psychology combined and a second year in psychology of adolescence, mental defectives and graduate courses in same general field.

The point of view should be prevailingly genetic.

One year of theoretical discussions supplemented by practical tests.

Experiments in the learning process and a good text and lecture course.

Introductory general psychology, introductory educational and genetic psychology with advanced and graduate courses.

Laws of growth and the educative process.

Reasonable analysis of the child mind and life, the nature and purpose of the school, various methods of teaching based on psychology of learning and of school subjects.

The foregoing suggestions should be enriched by a few citations of methods found successful in some schools. Colvin at Brown University offers a one semester undergraduate course to seniors followed by a practical course in "Introduction to Secondary Teaching" with observation and some slight practice. In this second course the more general principles of the

first course are given practical application. A graduate course is offered consisting of laboratory work, readings, discussions and problems under school conditions. Kohl of Mount Holyoke writes:

"I have had the best success the past year I have ever had. My students all go out to teach in small high schools. I have visited more than 200 classes in high schools the past year and I take actual concrete school situations and present them to the classes to psychologize. This has given vitality to the work and puts the students face to face with applying psychology to problems which they are to meet daily in teaching. It is a very difficult matter to get the material, but it counts."

Davidson of Leland Stanford writes:

". . . the subject should be so arranged and presented that it should not merely offer a 'point of view' but rather a substantial basis for teaching and educational practice. To this end each sub-division of the subject should turn upon the study of one main type of mental process and this be prosecuted with thoroughness especially with reference to age differences and pedagogical applications after the ground has been covered in more general courses. When this is done the student should be ready for the details of pedagogical technique in advanced courses in mental testing and experimental pedagogy. The work would then have three phases: first, as introduction to psychology, educational and genetic; then the substance of the subject in about four or five semester courses either contemporaneously or in sequence, and finally the drill in the application to mental testing and pedagogical practice. I assume that laboratory practice and statistical method will be taken care of either incidentally or in separate courses. All of this is with reference to students who will be educators, that is either supervising school officers, normal school instructors or college instructors in education, and of course educational investigators. For secondary teachers the course could probably at present not be so thorough and would have to be adapted, but still with reference to the same three phases."

Davidson suggests also that courses in education should be differentiated according to the type of educator in view, and that with such an organization in mind the subject matter even of educational psychology would vary with the class of students being prepared.

J. Carleton Bell of Texas and Terman of Leland Stanford emphasize the need of stressing the behavior point of view in educational psychology. Hints of the same attitude are scattered throughout several replies.

Summary.—The various suggestions regarding standard courses indicate strongly that the learning process should form the backbone of the course and that there should be constant application of this process in laboratories or in the school system. That is, the trend as expressed in these suggestions is purely scientific. The learning process is to be studied experimentally not *a priori*, and the field of experimentation is preferably the school system where conditions are normal for scientific investi-

gation. There is of course no end of difficulties to be faced in articulating with the public school system, but difficult as the situation is there is no other wholly adequate means of arriving at pedagogical truth. The suggestion of arrangement of courses in educational psychology with sequence and correlation of subjects seems to follow that in actual practise. Whether or not the present organization is the best possible deserves free discussion at a representative conference of instructors in this field.

E. GENERAL CONCLUSIONS

In the beginning of this article it was stated that education and especially educational psychology claims to be a scientific subject because it prosecutes courses by means of experimentation and investigation. The questionnaire correspondence reported in the preceding pages supports this claim. A few general conclusions are quite obvious.

1. There is no general agreement on terminology or on the structure of courses in educational psychology. There should be some standardizing agency to bring about uniformity in these respects.

2. In general, courses include the study of the learning process with special attention to instincts, habit formation, imaging with particular reference to memory, association, thinking. School subjects are being analyzed psychologically. "Individual differences" are receiving much attention in connection with the study of exceptional children and the problem of retardation. The science of measurements is included as the *sine qua non* of accuracy in experimentation and investigation.

3. In seventeen institutions educational psychology is a distinct chair. In twenty-eight institutions the chair is combined with other subjects.

4. The most popular subject-combination is philosophy and education but there is noticeable a logical correlation, in the majority of cases, between educational psychology and other subjects taught by the same instructor.

5. General psychology prevails as a prerequisite to educational psychology. In this connection certain administrative problems appear important:

- a. Will a prerequisite course in general psychology, interpreted on a purely introspective basis, serve adequately as an

introduction to a course in educational psychology interpreted functionally and taught experimentally?

b. To what extent is it possible in the transfer of credits from school to school to recognize one type of psychology as taught elsewhere and offered as prerequisite to or in place of certain educational psychology courses in another school? In other words, should the mere time value (units) of a prerequisite suffice as now seems to be the only feasible method?

c. Should not courses in educational psychology serve a purpose so specific, that, unless the general courses in pure psychology are equally specific, there must be a distinct type of psychological propaedeutic to unify and make logical the advance from elementary to higher studies in this field? Is pure psychology *per se* a sufficient introduction to educational psychology as a study of specific applications?

d. May it not become necessary to have as prerequisites to educational psychology a distinct type of introductory psychology which deals with only those problems that require in higher courses a fuller and pedagogical treatment?

e. The suggestion that biology be substituted for general psychology as a more logical and helpful introduction to educational courses deserves careful consideration.

6. One semester courses in educational psychology predominate.

7. Texts by Thorndike and Colvin are used most frequently.

8. The lecture method is most popular, but in several institutions this is supplemented by laboratory methods.

9. In about one-third of the institutions there are fully equipped pedagogical laboratories.

10. Conceptions of standard courses stress the importance of experimentation, specific problems, application of the principles and laws of the learning process in school work, the differentiation of courses according to the type of "educator" in view.

11. In spite of much confusion of terminology and organization of courses there is evident a strong trend toward a well defined science of educational psychology. It is impossible to predict exactly what its standardized contents will eventually be. It is altogether possible, however, that the organization now in vogue will form an important basis for modification and elaboration.

THE MEASUREMENT OF ACHIEVEMENT IN ENGLISH GRAMMAR

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The measurement of achievement in English Grammar may be attacked from two angles. We may proceed to measure knowledge of formal grammar on the one hand, or ability to use the English language correctly on the other. I have attempted to prepare measurements for both phases. Scales for measuring usage will be described first and the tests for knowledge of technical grammar afterwards.

SCALES FOR MEASURING USAGE

In measuring any complex of mental functions, such as those involved in a school study, it is important to determine the essential factors in it. The two chief elements of usage, aside from composition, are undoubtedly grammatical correctness and punctuation. I shall present first the scales for measuring grammatical correctness and then discuss their derivation, advantages and limitations. The scale for punctuation will be considered immediately afterwards in a similar manner.

GRAMMATICAL SCALE A¹

Each of the following sentences gives in parenthesis two ways in which it may be stated. Cross out the one that you think is incorrect or bad. If you think both are incorrect cross both out. If you think both are correct underline both.

Step 5

1. It was so misty we (could hardly; couldn't hardly) see.
2. The gazette reported (he; him) to be dead.
3. He was a patriot, but all the rest (were traitors; traitors).

Step 6

1. On the way we met a Mr. Osborn from the neighborhood of Denver, (and who; who) had the typical western breeziness.
2. Gravity is (when a stone falls; a force that causes a stone to fall) to the ground.
3. I can do it as well as (they; them).
4. It is (me; I).

¹ Copies of this scale and of the other tests mentioned in this article for purposes of measuring classes and schools may be obtained from the author.

Step 7

1. A fireman seldom rises above (an engineer; the position of an engineer).
2. The difference between summer and winter (is that; is) summer is warm and winter is cold.
3. He is happier than (me; I).
4. They are (allowed; not allowed) to go only on Saturdays.

Step 8

1. (In; as I was) talking to Smith the other day, he told me about the race.
2. (When I was; when) six years old, my grandfather died.
3. You must not cut the cake until (thoroughly cooked; it is thoroughly cooked).
4. I shall always remember the town because of (the good times I had; the good times) and the many friends I made there.

Step 9

1. It tastes (good; well).
2. Send (whoever; whomever) will do the work.
3. (Who; whom) do you mean?
4. You (will; shall) not stir; I forbid it.

Step 10

1. I intended (to answer; to have answered).
2. I met many people there whom I had seen before (but did not know **their** names; whose names I did not know).
3. I (will; shall) help you; I promise it.
4. Having come of age, (I took my son; my son entered) into partnership with me.

Step 11

1. It was not necessary for you (to have gone; to go).
2. There were some people (whom; about whom) I could not tell whether they were English or American.
3. He came home with an increase in weight, but (hard work soon reduced it; which hard work soon reduced).
4. A different set of knives and forks (was; were) put on the table.

Step 12

1. The sheets of tin are laid in rows, (and care is taken; with care) that all the sheets fit snugly.
2. (Lincoln's assassination; the assassination of Lincoln) was a great tragedy.
3. He is (not only discourteous; discourteous not only) to the students but also to the teachers.
4. He had no love (or confidence in his employer; for his employer and no confidence in him).

Step 14

1. The man (whom; who) I thought was my friend deceived me.
2. (He sprang; springing) to the platform on which the dead man lay (and shouted; he shouted).
3. (Shall; will) you be recognized, do you think?

Step 15

1. They returned at night without any (one's; one) seeing.

Step 16

1. A man who (would; should) do that would be hated.
2. Do you (expect ever; ever expect) to go again?

Name.....Date.....
 School.....Grade.....
 City.....

Scoring the tests. The scale is composed of a series of increasing steps of equal differences of difficulty. A pupil's rating on the scale is the highest step passed and a step is passed if not more than one of the four sentences is missed. In case a pupil passes all the steps up to a certain point and then fails on one but passes additional steps beyond that point he is credited with all the additional steps passed. For example, if a pupil passes all steps up to and including the 8th and fails on all beyond the 8th, his score will be 8. But if he fails on the 9th, passes the 10th, and then fails on the rest, his score will be 9. He is credited with all additional steps passed. This sort of record occurs about once in five and is due to the fact that there are only four sentences in each step. If there were ten or twelve sentences in each step such a record would rarely, if ever, occur. The reasons for regarding a step passed if 3 of the 4 sentences are marked correctly, that is 75 per cent. of them, will be obvious to all who are familiar with the principles underlying the psychological methods of measuring thresholds.

Derivation of the Scale. Grammatical scale A was derived experimentally by preparing a test sheet containing 100 sentences of a nature similar to those in the scale. A test was then conducted with over 1000 pupils in six schools in various parts of the country, distributed about evenly through the upper four grades, the four years of the high school and the university. These tests were scored and tabulated to show the percentage of times each sentence was marked correctly.

On the basis of these percentages of correctness the sentences for scale A were selected as follows. In order to obtain equal increments in difficulty in the successive steps, it is obvious that if human traits are distributed according to the law of chance, the sentences for each step will have to be selected so that the percentage of correctness for the various steps will conform to the normal probability distribution. Equal differences in the percentage of correctness would not produce equal differences in difficulty. A series of sentences having a percentage of correctness of 90, 80, 70, 60, 50, 40, 30, 20, 10, would not be separated by equally difficult steps. The steps in the middle of the scale would be much smaller than those at the ends. For example a sentence marked correctly by 45% of the pupils would not represent as large an advance in difficulty over one marked cor-

rectly by 50% of the pupils as the advance represented by a sentence marked correctly by 10% over one marked correctly by 15% of the pupils. The latter step would be approximately three times as large as the former. An objective scale for measuring mental capacities which shall be comparable to a linear scale or a scale of weights, must have equal steps.

On this basis and according to the values of the probability integral, the required percentages of correctness were computed so that the differences in difficulty between any two steps would be equal to the difference in difficulty between any other two steps. Four sentences marked correctly by 62.5% or very close to that, were arbitrarily designated as step 10, the middle point on the scale. The completed scale would have 20 steps ranging from 0 to 20. 50% of correctness should normally have been selected for step 10 since that is the median point of the curve, but in the particular form of the directions given at the head of scale A, a sentence would be marked correctly by pure chance once in 4 times. Hence we must assume that the zero point is 25% correctness and that 62.5% is the middle point on the range from 25% to 100%. Values for the remaining steps were then computed to be as follows:

Step	4 equals	95.1%	correct
5	"	92.9%	"
6	"	89.4%	"
7	"	84.5%	"
8	"	78.5%	"
9	"	70.7%	"
10	"	62.5%	"
11	"	54.3%	"
12	"	46.5%	"
13	"	40.5%	"
14	"	35.9%	"
15	"	32.1%	"
16	"	28.5%	"

Four sentences, which conformed to the required percentages of correctness for each step, were selected and arranged in the form of scale A. The sentences, of course, do not have absolutely these values but they were selected to conform as closely as possible. In no case, however, does a sentence deviate more than .2 of a step from its required value. The scale runs down only as far as step 5 because there were no sentences in the original test blank sufficiently easy to fit the required percentages of correctness for lower steps. Some of the upper steps have

fewer than four sentences because there were not enough sentences of correctness for lower steps. Some of the upper steps have fewer than four sentences because there were not enough sentences of the proper degree of difficulty to fit into these higher steps. The scale, however, as it stands is sufficiently easy at the lower end to measure adequately the ability of pupils in the lower grades and sufficiently difficult at the upper end to measure adequately the ability of university seniors.

Advantages, Limitations and Improvements of the Scale. The advantages of the scale are those of definiteness, objectivity, comparability, and convenience of measurement. The scoring can be done quickly. With the help of a key, any person, who may know nothing about grammar or correct usage, can score the tests as well as a linguist can. After a few papers of a given class have been scored, it becomes unnecessary to look through the entire test as the examiner will know approximately at what part of the scale to look. If a pupil has failed on two successive steps, it is likewise unnecessary to look any further, as he will not pass any steps beyond that point.

The limitations of the scale are the incompleteness of the steps at the upper and lower ends and the fact of having only four sentences for each step. The former limitation is of minor importance since the scale in its present form is sufficiently extensive to measure a very wide range of ability. The scale will be extended at both ends by further experimentation so as to add sentences of the required degrees of difficulty.

The second limitation can be overcome experimentally by finding additional sentences for each step. This has been done by preparing scales B and C with corresponding steps of identical degrees of difficulty. Scales B and C were constructed by the same process as scale A. The sentences in scales B and C, however, do not fit into their respective steps as accurately as those in scale A. While each group of 4 sentences as a whole is very nearly identical in difficulty with the corresponding steps in scale A, some individual sentences deviate .3 of a step from the specified values.

GRAMMATICAL SCALE B

Each of the following sentences gives in parenthesis two ways in which it may be stated. Cross out the one that you think is incorrect or bad. If you think both are incorrect cross both out. If you think both are correct underline both.

Step 7

1. I feared you (should; would) fail.
2. Any man who could accomplish that task, the whole world would (think he was a hero; regard as a hero).
3. He had to earn money (that is; is) the reason he stayed out of college.
4. He went to school (thereby; and thereby) improving his mind.

Step 8

1. The fact that I had never before studied at home, (I was at a loss; made me feel at a loss as to) what to do with vacant periods.
2. Both are going,—(he and she; him and her).
3. I don't believe I (will; shall) be able to go.
4. It is (the handsomest vase I almost; almost the handsomest vase I) ever saw.

Step 9

1. We ate such a dinner as only laborers (can eat; can).
2. He was deaf, (caused by; as the result of) an early attack of scarlet fever.
3. I asked what were the names of her puppies and (kitten; her kitten).
4. Every one opened (his; their) window.

Step 10

1. The captain, as well as the mate and the pilot, (was; were) frightened.
2. (That's all I want, is a chance; that's all I want—a chance) to test it thoroughly.
3. He is the tallest of (all the men; any man) in the regiment.
4. (I walked out into the night as the moon rose; as the moon rose, I walked out into the night) and wandered through the grounds.

Step 11

1. There we landed, and having eaten our lunch (the steamboat departed; we saw the steamboat depart).
2. (After pointing; when he had pointed) out my errors, I was dismissed.
3. The question of (whom; who) should be leader arose.
4. He spoke to some of us,—namely (she and I; her and me).

Step 12

1. It has no relation (to; as to) time or place.
2. He left for Pittsburgh on Thursday (arriving; and arrived) there on Sunday.
3. Fostoria is as large (if not larger than Delaware; as Delaware, if not larger).
4. He kept it (safe; safely). (That is, through his keeping, it was safe.)

Name.....Date.....

School.....Grade.....

City.....

GRAMMATICAL SCALE C

Each of the following sentences gives in parenthesis two ways in which it may be stated. Cross out the one that you think is incorrect or bad. If you think both are incorrect cross both out. If you think both are correct underline both.

Step 7

1. The life of a hod-carrier is sometimes happier than (a prince; that of a prince).
2. (There were two hundred; two hundred) students went.
3. He wrapped it (tight; tightly). (Referring to the manner of wrapping).
4. He did what many others (have; have done) and are doing.

Step 8

1. The fire was built and the potatoes (baked; were baked).
2. I was detained by business (is; that is) the reason I am late.
3. The difference between them (is; is that) De Quincey is humorous and Macaulay is grave.
4. (Shall; will) you do the deed?

Step 9

1. The box, including the apples, (were; was) lost.
2. Oak, brass, and steel (is; are) the material of the structure.
3. The ball is thrown home by a player (stationed in the middle of the square called the pitcher; called the pitcher, who is stationed in the middle of the square).
4. I paddled the boat for a while, (then; and then) fell into a reverie.

Step 10

1. If they (would; should) find it, I should rejoice.
2. One or the other of those fellows (have; has) stolen it.
3. I went there in order to (inspect it personally; personally inspect it).
4. They would neither speak to him (nor would they; nor) look at him.

Step 11

1. A new order of ideas and principles (have; has) been instituted.
2. Every morning I take a run (and immediately afterward; followed by) a shower bath.
3. (The benefactor of mankind; mankind's benefactor) is honored by all.
4. (Who; whom) did you say won?

Name.....Date.....

School.....Grade.....

City of.....

The advantage in the three scales is that whenever a more accurate measurement is desired than that afforded by a single test, more than one scale may be used and an average of the scores taken.

Another advantage in having several commensurate scales is the measurement of progress of the same class of pupils from time to time by using a different scale each time. As a matter of fact, progress may be measured very accurately by using the same scale at different times provided that no drilling or coaching on the scale is done. Without specific instruction on the material of the scales, they may be used repeatedly with the same class without appreciable error. The following situation illustrates how little effect even definite knowledge of the correctness of the various sentences has upon the results of repeated tests. A class of 65 university juniors and seniors went through the test and scored, according to a key, their own papers and from 6 to 10 other papers each. Three weeks later the test was repeated with the result that the average score of the class was

only half a step higher than it had been in the first test. When specific knowledge about the material of the scale produces so little difference after only three weeks, it seems very improbable that the performance of the test without further reference to it will have any appreciable effect whatever upon a repetition of the test after an interval of several weeks or months.

Standards of Attainment. On the basis of tests made in four schools, the following tentative standards of attainment for June of the respective years have been obtained.

		High School				College	
Grade....	7	8	F.	So.	Jr.	Sr.	Jr.
Score....	8.0	8.3	8.6	8.9	9.2	9.5	10.3

PUNCTUATION SCALE A

The scale for punctuation was derived by a process of experimentation and computation entirely identical with that by which the grammatical scales were derived. The original test with a larger set of sentences was made with the same groups of pupils as the grammatical test. The number and percentage of times each sentence was punctuated correctly was then computed and the selection of sentences for the scale was made also according to the distribution of the probability curve. In this computation, however, the 50% point was taken as the middle point instead of the 62.5% point since the element of chance does not enter here as in the case of grammatical scale. The sentences for the various steps were selected according to the following percentages of correctness:

Step	4 equals	93.5%	correct
5	"	90.5%	"
6	"	85.9%	"
7	"	79.3%	"
8	"	71.3%	"
9	"	61.0%	"
10	"	50.0%	"
11	"	39.0%	"
12	"	28.7%	"
13	"	20.7%	"
14	"	14.1%	"
15	"	9.5%	"
16	"	6.5%	"

PUNCTUATION SCALE A

Punctuate the following sentences.

Step 6

1. We visited New York the largest city in America.
2. Everything being ready the guard blew his horn.
3. There were blue green and red flags.
4. If you come bring my book.

Step 7

1. I told him but he would not listen.
2. Concerning the election there is one fact of much importance.
3. The guests having departed we closed the door.
4. The train moved swiftly but Turner arrived too late.

Step 8

1. Last year I studied grammar history and geography.
2. Next we went to Vienna the capital of Austria.
3. But alas this was not the case.
4. Ever since Betty has loved the flag.

Step 9

1. He was satisfied I suppose with his situation.
2. A faithful sincere friend is prized highly.
3. The present situation however is very different.
4. Our national Capitol situated in Washington is a magnificent building.

Step 10

1. A tall square building is located on State street.
2. Washington Irving whose personality was genial and charming became very popular in England.
3. You see John how I stand.
4. On the path leading to the cellar steps were heard.

Step 11

1. Paris Illinois is a smaller city than Paris France.
2. He asked what is the matter.
3. I like to work he said especially in the morning.
4. Chicago Illinois is a large city.

Step 12

1. When thou goest forth by day my bullet shall whistle past thee when thou liest down by night my knife is at thy throat.
2. Oh come you'd better.
3. The President bowed then Hughes began to speak.

Step 13

1. I saw no reason for moving therefore I stayed still.
2. There are three causes poverty injustice and indolence.

Step 14

1. He said that he had lent his neighbor an ax that on the next day needing the ax he had gone to get it and that his neighbor had denied borrowing it.

Step 16

1. As in warfare a band of men though strong and brave individually is collectively weak if it is not well organized so a speech a report an editorial an essay any composition though its parts may be forcible or clever is weak as a whole if it is not well organized.

Name.....Date.....

School.....Grade.....

City.....

The scoring is done in the same manner as with the grammatical scales. A step is passed if at least three of the four sentences are punctuated correctly. If any mark is inserted incorrectly or is missing, the entire sentence is considered a failure.

With regard to use, advantages, limitations, and improvements of the punctuation scale, the statements made in connection with the grammatical scales apply here equally well, and hence need not be repeated.

The following are tentative standard scores of attainment for June of the respective school years.

Grade....	7	8	High School				College
			F.	S.	J.	S.	J.
Score.....	8.0	8.3	8.6	8.9	9.2	9.5	10.3

TESTS FOR MEASURING GRAMMATICAL KNOWLEDGE

Technical knowledge of grammar is perhaps more difficult to measure than usage on account of its complexity. Adequate tests should cover the chief parts of the field. Three types of tests will be described. They are not complete for all phases of grammar but they measure several important divisions.

ENGLISH GRAMMAR TEST 1. SCORE

Indicate the parts of speech in the following text by placing above each word the abbreviation for its part of speech. Work as rapidly as possible. Three minutes will be allowed. Use the following abbreviations.

noun—n	verb—v	conjunction—c
pronoun—pro	adverb—adv	interjection—i
adjective—adj	preposition—pre	

Maggie's eyes had begun to sparkle and her cheeks to flush—she was really beginning to instruct the gypsies and gaining great influence over them. The gypsies themselves were not without amazement at this talk, though their attention was divided by the contents of Maggie's pocket, which the friend at her right hand by this time emptied without attracting her notice.

"Is that where you live, my little lady?" said the old woman at the mention of Columbus.

"Oh, no!" said Maggie, with some pity; "Columbus was a very wonderful man who found out half the world, and they put chains on him and treated him very badly, you know—it's in my catechism of geography but perhaps it's rather too long to tell before tea."

"Yes, my home is pretty, and I'm very fond of the river where we go fishing; but I'm often very unhappy. I should have liked to bring my books with me, but I came away in a hurry, you know. But I can tell you almost everything there is in my books, I've read them so many times, and that will amuse you. And I can tell you something about geography, too—that's about the world we live in—very useful and interesting."

Name.....Date.....

School.....Grade.....

City.....

This test is scored by determining the number of words designated correctly. In case of a word which may be designated

differently, it is counted correct if it is permissible according to good authority. For example, Maggie's is considered correct if it is marked either as noun or as adjective.

The following are provisional standard scores of achievement for the ends of the various school years.

Grade.....	7	8	High School				College
			F.	S.	J.	S.	
Score.....	30	33	36	40	43	46	60

ENGLISH GRAMMAR TEST 2. SCORE

Indicate the case of each noun and each pronoun in the following text by placing above each one the abbreviation for its case. Work as rapidly as possible. Three minutes will be allowed. Use the following abbreviations:

nominative—n

possessive—p

objective—o

After crossing the gully and walking on through the woods for what they thought a safe distance, they turned into the path. They were talking very merrily about the General and Hugh and their friend Mills, and were discussing some romantic plan for the recapture of their horses from the enemy, when they came out of the path into the road, and found themselves within twenty yards of a group of Federal soldiers, quietly sitting on their horses, evidently guarding the road.

"Where are you boys going?" he asked, as he came up to them.

"Going home."

"Where do you belong?"

"Over there—at Oakland," pointing in the direction of their home, which seemed suddenly to have moved a thousand miles away.

"Where have you been?" The other soldiers had come up now.

"Been down this way." The boys' voices were never so meek before. Each reply was like an apology.

"Been to see your brother?" asked one who had not spoken before—a pleasant looking fellow. The boys looked at him. They were paralyzed by dread of the approaching question.

"Now, boys, we know where you have been," said a small fellow, who wore a yellow chevron on his arm. He had a thin mustache and a sharp nose, and rode a wiry, dull, sorrel horse. "You may just as well tell us all about it. We know you have seen them, and we are going to make you carry us where they are."

Name.....Date.....

School.....Grade.....

City.....

This test is scored by determining the total number of nouns and pronouns designated correctly. The following are provisional standard scores.

Grade.....	7	8	High School				College
			F.	S.	J.	S.	
Score.....	13	16	20	23	26	30	45

ENGLISH GRAMMAR TEST 3. SCORE

Indicate the tense and the mode of the following verb forms by placing above each example the abbreviation for its tense and mode. Work as rapidly as possible. Three minutes will be allowed. Use the following abbreviations.

- present—pr.
past—pa
future—fu
present perfect—pr. p.
past perfect—pa. p.

future perfect—fu. p.
indicative mode—in.
subjunctive mode—su.
imperative mode—im.

If a verb has the present tense and the indicative mode, place above it pr. in.
I wait. I will have cut. You talked. If you become. He will think. If he wished. We have played. Break the stick. They had shown. I stayed. If I drink. You will look. If you found. He has walked. Do your work. We had spun. We cry. They will have run. I will grow. If I punished. You have seemed. Wear your hat. He has. He had called. We will have slept. If they begin. We gave. I have eaten. Seek your pencil. You had seen. He spoke. He will have fallen. We will take. If we drive. If they drew. You depart. They sell. I had flown. They bought. You will have been. They will swim. If he go. They have stolen. If we bit. Lift your hat.

Name.....Date.....

School.....Grade.....

City.....

A tense or a mode given correctly counts as one point each. Every verb form for which both are given correctly counts as two points. The total number designated correctly constitutes the score. The following are provisional standard scores.

		High School				College
		<div>F. S. J. S.</div>				S.
Grade.....	7	8				
Score.....	13	16	20	23	26	30
						45

Limitations and Improvements of the Tests. The two chief limitations of these tests are, first, the failure to cover all phases of grammatical knowledge and, second, the counting of any designation of a part of speech, case, tense, or mode as equal to any other. The former shortcoming may be overcome by adding other tests of a similar nature to cover the remaining aspects of grammatical knowledge. A test on sentence analysis or diagramming ought very likely be added. The second limitation may be remedied by scaling the values of the various designations. In spite of these limitations, which fundamentally are not of a serious character, these tests provide measures of grammatical knowledge which are quite accurate and far more accurate than ordinary methods of testing and marking. These limitations are pointed out here because it is important to recognize in a fair way what the defects of any scale or test are, since the ultimate usefulness of any measuring instrument depends upon its degree of accuracy.

COMMUNICATIONS AND DISCUSSIONS

DISPARITY OF SPELLING SCALES

The two spelling scales recently published, one by Buckingham and one by Ayres, show eighty-five words in common, enough to make a comparison of the two scales fairly reliable. The fact that these eighty-five words constitute a larger percentage of Buckingham's list than of Ayres' would seem to make little difference, since in each list the words are scaled individually and bear an individual rather than a group relation to the other words and to the respective scales. It will be recalled that Ayres arranges his list in groups, A to Z, ranked in order of increasing difficulty from the easiest to the hardest, as determined by the percentage of pupils in the various grades who spell the words correctly, and that the words in any particular group are of "approximately equal spelling difficulty." Buckingham, on the other hand, scales each word separately, giving it a numerical value in terms of probable error which is computed from a calculated absolute zero of difficulty. For details of these values the reader is referred to the original monograph, and to the writer's discussion in a current number of *School and Society*.

The list of words in Table I is shown in the order of difficulty as indicated by Buckingham, with the scale values set opposite each word. In the next column is the letter indicating the group in which Ayres places the word. A rough examination of the two scale notations shows a decided lack of agreement. To determine the exact relationship for each of the words it is necessary to reduce them to some common measure. The standard deviation is probably the best measure in such cases. Hence, by assigning arbitrary values with unit intervals to Ayres' group the standard deviation was found to be 6. Similar calculation based upon Buckingham values shows the standard deviation in this case to be 164. These two values are directly comparable showing that one unit of Ayres' scale is equivalent to 27.33 units of Buckingham's scale. With this as a basis, and by calculating from the median point of the two distributions, Ayres' positions may be read in Buckingham's units.

TABLE I

WORDS	Buckingham Scale values	Ayres' groups	Buckingham's groups	Differences	Preferred words	WORDS	Buckingham Scale values	Ayres' groups	Buckingham's groups	Differences	Preferred words
he.....	245	E	A	115		bought.....	587	M	M	-8	-8
is.....	265	C	B	40		also.....	591	M	M	-12	
the.....	277	D	B	56		pretty.....	601	M	N	-22	-22
and.....	298	B	B	-20		getting.....	615	O	N	18	
will.....	300	E	C	60		Tuesday.....	625	O	O	8	8
on.....	301	B	C	-23		sure.....	627	N	O	-21	-21
go.....	328	B	D	-50		answer.....	629	P	O	32	32
me.....	336	A	D	-95		nor.....	635	N	O	-29	-29
to.....	343	H	D	99		raise.....	635	O	O	-2	-2
for.....	348	H	E	92		beautiful.....	638	P	O	23	23
you.....	371	E	E	11		almost.....	640	M	O	-61	
not.....	374	E	F	-14		ought.....	644	T	O	-136	
man.....	377	D	F	-44		forty.....	646	O	O	-13	-13
do.....	378	A	F	-127		always.....	652	N	P	-46	
in.....	381	D	F	-48		weather.....	652	O	P	-19	
him.....	385	F	F	2		wear.....	654	R	P	61	61
no.....	388	D	F	-55		chain.....	664	N	P	-58	
one.....	388	H	F	54		minute.....	664	T	P	116	116
at.....	405	B	G	-127		whole.....	672	O	P	-39	-39
into.....	408	F	G	-21		running.....	672	Q	P	16	
are.....	411	G	G	4		often.....	677	S	Q	66	
of.....	413	F	G	-26		against.....	681	R	Q	34	34
has.....	416	H	G	26		neighbor.....	691	R	Q	24	
all.....	418	F	G	-31		guess.....	706	T	R	64	64
school.....	427	G	G	-12		purpose.....	728	R	R	-13	
they.....	483	K	J	41		present.....	735	Q	S	-47	
light.....	493	K	J	31		already.....	740	R	S	-25	-25
every.....	506	J	J	9		believe.....	749	S	S	-6	
coming.....	509	K	J	15		receive.....	759	N	T	-153	
send.....	516	H	K	-76		beginning.....	762	U	T	35	35
only.....	527	K	K	-3	-3	improvement...	778	S	T	-35	
even.....	540	K	L	-16	-16	assure.....	781	U	T	16	
road.....	543	L	L	8		sometimes.....	798	Q	U	110	
because.....	543	L	L	8		importance.....	800	P	U	-139	
table.....	544	L	L	7		accident.....	802	T	U	-32	
picture.....	557	M	L	22		too.....	819	S	V	-76	-76
learn.....	557	N	L	49		therefore.....	830	S	V	-87	
front.....	576	N	M	30	30	experience.....	836	V	V	-11	
another.....	578	L	M	-27	-27	business.....	847	T	W	-77	
pass.....	579	L	M	-28		character.....	848	W	W	4	
pair.....	582	N	M	24		necessary.....	862	U	W	-65	
lesson.....	584	L	M	-33	-33	disappoint.....	868	X	X	11	
thought.....	586	N	M	20							

Av. Dis. 42

Av. Dis. 33

The method of determining these values was as follows: The average of Ayres' values was found to lie midway between groups L and M. The average for Buckingham's values was found to be 565. By superimposing these two points, and subtracting and adding one-half the interval value to Buckingham's average, the readings for L and M respectively are obtained. By subtracting the interval value -27.33 successively from L, K, etc., values may be found for each of the groups to the lower end of the scale. By adding this interval value successively to M, N, etc., values may be found for each of the groups in the upper reaches of the scale. These values are shown in Table II.

TABLE II.

Showing spelling difficulties of the median of Ayres' groups in terms of Buckingham's scale units

A = 251	J = 497	S = 743
B = 278	K = 524	T = 770
C = 305	L = 551	U = 797
D = 333	M = 579	V = 825
E = 360	N = 606	W = 852
F = 387	O = 633	X = 879
G = 415	P = 661	Y = 906
H = 442	Q = 688	Z = 934
I = 469	R = 715	

Now, assuming that the values thus assigned are the median values for Ayres' groups, the span for any group would include all values lying within 13.67 units on either side of the median. In this way the words have been placed in Ayres' groups according to Buckingham's values. The positions thus taken are shown in the fourth column of table I. It is seen here that only nineteen words remain in the group where Ayres placed them. The approximate amount of displacement may be found by subtracting in each case Buckingham's value from the median value of the group in which Ayres originally placed the word. These differences are shown in the adjacent column in table I. The average displacement is found to be 42 of Buckingham's scale units, or 1.52 of Ayres' units. The probable displacement counting median to median is about 1.3. When the calculation is based only on those sixty-six words which lie outside the groups where Ayres placed them, the average displacement amounts to 55.77 of Buckingham's units, or 1.89 of Ayres'. It is probable that Buckingham's "preferred" words are more reliably placed than the upper and lower supplementary lists. When only the 22 words of Buckingham's "preferred" list are considered, the displacement is 33 of Buck-

ingham's units or 1.3 of Ayres' units with a probable displacement of about 1 of Ayres' units, showing that the claims to greater reliability are justified. The extreme displacements, *e. g.*, "minute" from T to P, and "receive" from N to T, show a total range of 10 of Ayres' units. One of these extremes, furthermore, is in Buckingham's "preferred" list. Assuming that Ayres' placement is correct, it is seen that Buckingham's values are approximately correct for nineteen of the words, are too high for thirty-eight and too low for thirty-eight of them. Buckingham's "preferred" values are in conformity in five cases, are too high in eight and too low in nine cases.

The general conclusion is that the two scales are in such disagreement as to the relative difficulty of the words that are common to them that both may well be challenged until the trustworthiness of one of them has been established. Such a procedure should not be difficult since these larger fundamental studies have blazed a trail for future students. Let us hope that by concentrating upon a few words at a time, wholly trustworthy points upon the scale may be established so as to give a basis for a closer study of just why words really require greater spelling ability.

L. W. SACKETT.

University of Texas.

TEACHING DENOMINATE NUMBERS

A topic rarely mentioned in experiments on Arithmetic is that of the teaching of denominate numbers. This topic usually appears about the sixth year of the child's school life, receives very little attention from the makers of text books, and up to the present time has been hardly noticed in the ever increasing volume of arithmetical investigations. The following is an account of an experiment which might be helpful to teachers and supervisors of arithmetic.

The purpose of the experiment was to determine the best method of making permanent the necessary associations that have to be formed in memorizing the various items in the tables. The usual method of teaching these tables is to have the children memorize item after item, and after various parts of the tables have been thoroughly memorized, they are generally applied to problems. In the experiment performed on one hundred school children, the following method of procedure was adopted: First, an intelligence test was given. This consisted of seven arithmetical problems and part of the language

tests selected from Bonser's Tests. These tests were given to four classes of the 6A (sixth year, first half). Upon the results derived from these tests, two classes were selected which were of equal intelligence. These two classes were given the following experiments. The procedure adopted was as follows: The table that was to be memorized was cubic measure, consisting of the following items:

1728 cu. in. equals 1 cu. ft.

27 cu. ft. equals 1 cu. yd.

It was first ascertained that this table was entirely unfamiliar to the pupils of either of the two classes selected. The method of presentation in one class followed the traditional custom. The two items were presented. Each of the children was called upon to repeat each part. The class repeated in unison. Blackboard and written drill followed. This was continued for a period covering ten minutes each day for a period of three days.

The second class was given problems the solution of which called for a knowledge of the tables. Each child received a mimeographed sheet containing the two items of the table that were to be memorized. About five or six problems were presented each day. The time covered in this class was the same as in the traditional drill class; namely, ten minutes each day for a period of three days. On the fourth day a similar test was presented to each of the classes. During the test the applied drill class were not permitted to use the mimeographed sheet containing the tables.

The results obtained from the test were as follows:

6A—traditional drill class averaged 58%

6A—applied drill class averaged 64%

For our purposes it was not considered necessary to make a further analysis of the results, except to obtain an average.

During the following week, the attempt was made to give each of the two selected classes the portions of the linear table which had not yet been taught in the previous grades. The elements that were made the subject of instruction were:

$5\frac{1}{2}$ yds. equals 1 rd.

320 rds. equals 1 mile

In the course of this experiment, the class which had been given the traditional method of drill was now tried by the new method of applied drill; while the class that had been given the applied drill was now

given the traditional method; time allowance was the same; namely, periods of ten minutes extending over three days. The results were as follows:

Traditional Drill class averaged—62%
Applied Drill class averaged—68%

Upon examination of the course of study of any city in the United States we find that in the fifth and sixth years of the school life of the child about one-half to three-fourths of the time spent on arithmetic is devoted to learning the various tables and their use in applied problems. It is therefore important that an economical method of teaching such tables be found. It may be that the method of applied drill takes as much time as the traditional methods, but if the results are better, the method used justifies itself.

It appears from the results obtained in our experiment that the applied drill class has in every case given the better results. The extra task of preparing the mimeographed sheets would be repaid by the greater efficiency obtained in the use of the tables.

ISIDORE SPRINGER.

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AN EDUCATIONAL LABORATORY

The University Elementary School, at the University of Missouri, served in a striking way in the summer session of 1915 to show the value of such an objective instrument in the study of problems of supervision and elementary education. Theory was quite set aside and the daily work of this school was the object of study. Professor Meriam conducted one course in supervision and one course in elementary education. Thirty-eight superintendents in the former and one hundred thirty-eight grade teachers in the latter were required to spend a minimum of two hours each week observing in this elementary school. Interest in the work of this school led to an average of one hundred and twenty-five observing teachers daily.

This University Elementary School is a laboratory in the School of Education. The curriculum is the chief professional problem now studied. A curriculum is being formulated in terms of the activities of children and of adults in home and community life. The problem for the school is, "To help boys and girls do better in all those wholesome activities in which they normally engage." The subject matter in the traditional "Three R's" is taught only as it is needed.

The school last summer enrolled about one hundred pupils, distributed throughout the seven grades. None of these pupils received any mark of credit or advancement for the work. The school was in session five weeks, from 9 to 11 each day. From 11 to 12 each day pupils were invited to use the play ground apparatus (baseball, swings, giant stride, etc.) under direction of a playground teacher. At the end of the five weeks the regular school work closed, but the children were promised that the playground would be kept open for two weeks longer. However, the playground was not as attractive as the school and there were too few pupils to continue it.

The school was taught by the four regular teachers, and was conducted very much as in the regular session. Professor Meriam devoted two hours, 9 to 11, to directing the 125 observing teachers. At 11 and 12 he met his two classes for lecture and discussion. About one-half the time the larger class met in sections conducted by the instructor's assistants. For each hour of observation each visiting teacher was required to write on a 3 by 5 card a report of his observation. Special topics were announced from time to time. These reports served to center the attention of observers and were a basis for class discussion. Comparatively little educational literature was used but considerable attention was devoted to an excellent school library of about 2000 volumes. This library is used in the University Elementary School in place of text books.

Plans are being made for a still more extended use of this school in the summer session of 1916.

J. C. B.

THE JOURNAL OF EDUCATIONAL PSYCHOLOGY

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AND HYGIENE, AND EDUCATIONAL STATISTICS

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VOLUME VI

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EDITORIAL

It is trite to say that we live in a scientific age, but the statement needs to be reiterated and reflected upon, with particular reference to its significance for education. In spite of the ever increasing activity in scientific investigation in the past half century, in spite of the cogent arguments that have been offered from Herbert Spencer's time to the present day for a greater consideration of science and the development of the scientific point of view in education, in spite of the titanic struggle now in progress, which is showing so conclusively to the nations involved the importance of thorough training in the natural sciences, public education is still dominated by traditional aims, and little is being accomplished in inculcating the scientific temper of thought. The recent investigation of Mr. Harris Hancock in *School and Society* shows that the majority of our leading men are entirely under the domination of the mathematical-classical ideal, and are almost impervious to the need for general information as to the progress of science.

**The Teaching of
Natural Science**

Of the four subjects that are of fundamental significance in any scheme of education, viz.: English, natural science, social science, and art, there would seem to be abundant reason from a study of the trend of contemporary life for putting natural science second only to English in its importance for education, yet the teaching of natural science presents a sorry spectacle of inadequacy or misdirected effort all along the line. In the elementary school there seems to be a reaction against the little time and attention that was formerly devoted to science teaching. Nature study has stood still or even declined in popularity, geography scarcely receives the relative amount of time that was formerly devoted to it, and physiology is taught largely in the interests of prohibition propaganda.

In the high school the enthusiasm for the study of science, which was so general a few decades ago that it threatened the existence of some of the other subjects, has died down, and the number of pupils taking science have relatively lost rather than gained ground. Science courses in college seem to be dominated largely by the aim of training for higher specialization, and the tendency is to eliminate more and more of the general student body. The teachers of science themselves are largely responsible for this. There has been too much insistence on consecration to scientific method, and the formal disciplinary idea of science as developing accuracy of method in thinking has come to be the lode star of science instruction. As a result the claim is made that elementary pupils are not sufficiently mature for the development of the scientific attitude of mind. The observational study of nature has been decried and flouted as unscientific, and little has been done to improve or develop the study of science in the elementary schools. In the high schools the teachers have been college trained, and have tended to carry over the methods by which they were taught to the pupils which now confront them. As a result, forms of physical experimentation and the mathematical aspects of physics have received undue attention at the hands of high school teachers. In college the cultural and general aspects of science are obscured by the technical and mathematical treatment, and those who do not intend to make professional use of the subject prefer to stand aside. The teaching of science needs a complete reorganization from bottom to top from the point of view of developing the keenest possible interest in the student for a broader knowledge of scientific discoveries in the world about him.

J. C. B.

NOTES AND NEWS

The president of Columbia University has nominated the following professors of the faculty of education to be members of a department of educational research, which department is charged with the work of instruction and research leading to the degree of doctor of philosophy for all candidates for that degree who elect education as their major subject: Professors Russell, McMurry, Monroe, E. L. Thorndike, Sachs, Dewey and Strayer.—*School and Society*.

In the training of teachers for elementary and secondary schools an apprenticeship in the actual work of teaching, under competent supervision and guidance, is receiving greater and greater emphasis. Dr. F. J. Kelly, director of the training school of the Emporia, Kansas, State Normal, and recently elected dean of the school of education at the University of Kansas, plans to secure a semester's work in practice teaching for every person who is preparing to teach in Kansas schools. Students who have already had experience in teaching will be assigned to model school classes, and those who have had no experience will be assigned to training teachers in the city schools. These training teachers will be appointed by the state, and will receive five dollars a month additional salary. In the neighboring state of Oklahoma sixteen high schools have complied with the provisions of an act passed by the last legislature, and have established courses for the training of elementary teachers.

Current educational journals announce the death of Booker T. Washington, founder and president of Tuskegee Institute, the best known educator that the negro race has produced; of Z. X. Snyder, president of the Colorado State Teachers College, for many years a prominent figure in the affairs of the National Education Association; and of John A. MacVannel, professor of the philosophy of education in Teachers College, Columbia University, author of important books on the history and principles of education.

John P. Garber, associate superintendent and author of several yearbooks on current developments in education, has been elected superintendent of schools of Philadelphia.

Dr. E. C. Elliott, professor of education in the University of Wisconsin, has been appointed Chancellor of the University of Montana. This office, which has but recently been created, carries with it the management of all the higher educational institutions of Montana. The appointment is a notable one.—*The American Schoolmaster*.

Dr. R. H. Richardson, for the past two years head of the department of psychology in the Kearney, Nebraska, State Normal School, has been appointed professor of education in the University of Maine.—*The American Schoolmaster*.

J. Mace Andress, who has been head of the department of educational psychology and school hygiene at the State Normal School, Worcester, Mass., for the past seven years, has been elected head of the department of psychology at the Boston Normal School to succeed Dr. Colin A. Scott, recently appointed professor of education at Mt. Holyoke College. Mr. Andress has the degrees A. B., Michigan State Normal College, '05, Ph. M., University of Chicago, '06, and A. M., Harvard University, '08. He was a scholar in education at Harvard, and for the last two years has been an honorary fellow in pedagogy at Clark University.

CURRENT PERIODICALS

SCHOOL AND SOCIETY. Vol. II, No. 27. July 3, 1915. FELIX ARNOLD. *The Unit of Supervision, Cost and Efficiency.* 1-11. A study of a questionnaire sent to eighty-three principals of New York City schools on the six most important functions of the school principal, and the chief deterrents to the rendition of the best service by the principal, is made the basis for a unit scheme of administrative work, involving supervision, classification and promotion, clerical work, and attention to visitors. The scheme is worked out on the basis of unit cost, and the author claims for it increased efficiency of service with reduced expenditure of money.

No. 28. July 10, 1915. HAROLD SELLERS COLTON. *The Bearing of High School Science on a College Course in General Zoology.* 69-72. One sometimes hears the view expressed by college teachers of science that they would rather have students who have had no previous science training in the high school than those who have had work in science. The present article is a statistical study of students from public high schools and private schools in the vicinity of Philadelphia on the basis of their previous science training and their attainments freshman zoology, Latin, and mathematics in the University of Pennsylvania. Students from private schools make a poor showing in zoology, while those from the Philadelphia high schools in which there are good courses in botany and zoology make the best showing. Chemistry and physics are of no advantage to a student for his standing in college zoology. The distribution of mathematics grades is like that for zoology, but students in private schools do as well in Latin as those from Philadelphia high schools.

No. 29. July 17, 1915. WILLIAM E. KELLICOTT. *The Examination of Certain Objections to the Missouri System of Grading.* 81-88. A defense of the Missouri system of grading in terms of ranking within a group, and an examination of the principal objections that have been offered to it. While admitting that the system has imperfections, the author believes that it is far superior to any other system of grading yet proposed.

ERNEST C. MOORE. *An Experiment in Teaching College Students How to Study.* 100-107. Four tests were given to a group of Harvard freshmen. In the first test they were given a selection from a newspaper, were allowed to read for one minute, and were asked to record the number of words read and to reproduce what they had read. A second test involved re-reading the selection. In the third test they were given the same selection and allowed fifteen minutes in which to write down all the questions they could raise concerning its contents.

In the fourth test they were given a new selection and allowed fifteen minutes to write a summary of it. The results of these tests are presented in a series of six diagrams.

No. 30. July 24, 1915. J. E. WALLACE WALLIN. *The Problem of the Feeble-Minded in its Educational and Social Bearings*. 115-121. A discussion of the care of mentally defective children after they leave the protection of the school. The author pleads for psycho-educational clinics that shall be assisted by social-industrial advisers or field agents, whose duty should include vocational surveys with reference to occupations suitable for the feeble minded, the placement of children, explaining to employers the child's limitations, protection from moral and economic exploitation, advice to parents, and the collection of reliable data on the economic after-careers of the children who leave our special schools.

WALTER A. JESSUP. *Standards and Current Practices*. 137-143. Returns from 867 cities on the topics that should be taught in arithmetic are here studied from the point of view of (1) the elimination of topics; (2) increased emphasis on topics; (3) the recitation time distribution; (4) the percentage of drill; (5) grade of text book introduction; (6) grade emphasis on topics; and (7) the standards of achievement. The last point is based upon Mr. Courtis' standards in fundamentals for the different grades.

No. 31. July 31, 1915. LUCY C. COGAN, AGNES M. CONKLIN, AND H. L. HOLLINGWORTH. *An Experimental Study of Self-Analysis, Estimates of Associates, and the Results of Tests*. 171-179. Twenty-five students, all of whom were acquainted with each other, were asked to arrange the names of the group in an order of merit according to their degree of possession of each of the following traits: neatness, intelligence, humor, conceit, beauty, vulgarity, snobbishness, refinement, and sociability. As each judge's own name appeared on the list, the ranking gave an indication of each student's estimate of his own status in each of these traits, as well as the position of his fellow students. The tests used were the Trabue Completion Test and six tests from the Woodworth-Wells Association Tests. The correlation of the psychological tests with estimated intelligence was high; that of academic records with estimated intelligence was low.

No. 32. August 7, 1915. W. D. REEVE. *Exhibit of High School Mathematics, Its History and Educational Value*. 191-197. An account of an experiment in the teaching of mathematics, in which an extended exhibit of work done by pupils and of models and devices for presenting mathematics in concrete form constituted an essential feature of the presentation. The author makes many excellent suggestions for vitalizing this exhibit and changing it to keep the interest of the students at a high pitch.

WILLIAM E. STARK. *Measurement of Eighth Grade Compositions*. 208-216. Two sets of composition papers were secured from eighth grade pupils of Hackensack, New Jersey. The first set contained

one hundred thirty-three, the second contained one hundred thirty-six papers. The subject assigned was "A Day of My Life," the time fifteen minutes, the space one page. An attempt was made to use the Hillegas and Harvard-Newton scales, but it was abandoned on account of the extreme variation. On the basis of the judgment of three judges, a scheme of six ranks was worked out. Samples were chosen for each of these ranks and these samples were evaluated in Hillegas scale units. This scale was then used in judging both series of compositions.

No. 33. August 14, 1915. LIGHTNER WITMER. *The Exceptional Child and the Training of Teachers for Exceptional Children.* 217-229. The author gives a valuable account of the history of the teaching of defectives, discusses the present interest in the training of the peculiar child, and presents arguments in favor of special training for teachers of this class of children.

DANIEL STARCH. *Can the Variability of Marks be Reduced?* 242-243. The author recounts an experiment in marking twenty-four compositions on the usual percentage scale, with seventy as the passing mark. The papers were divided into two groups of twelve each, and papers one to twelve were graded by eleven teachers, while papers thirteen to twenty-four were graded by twelve other teachers. Each teacher was then instructed to change his marks into terms of a five-step scale, so that one of the twelve papers would be marked Poor, two or three Inferior, four or five Medium, two or three Superior, and one Excellent. The values of these ratings were then computed in percentages according to an arbitrary scale, and the variation was found to be reduced to almost one half.

LYNN HAROLD HARRIS. *A Study in the Relation of Latin to English Composition.* 251-252. The author argues for Latin as a practical language, and shows that students who have studied Latin for four years are superior in spelling, definitions, and grades in rhetoric to those who have studied it for three, two, one, or no years. On the basis of these somewhat questionable returns, the author pleads for a clearer recognition of the value of Latin by teachers of English composition.

No. 34. August 21, 1915. ERNEST C. MOORE. *The Child in Modern Society.* 253-259. The author considers the effect of the present war upon our ideas of what is due the children, and makes the following demands of society: first, that the child be well born; second, that he be secured favorable physical surroundings in his early years; third, that he have a favorable home environment, which should be secured by the establishment of schools for mothers, on which attendance should be compulsory; and fourth, that a system of education be provided which will direct the attention of children to cultural rather than materialistic aims.

JOHN A. H. KEITH. *The Improvement of the Course of Study Through Organization.* 259-265. The objects of the course of study should

be first, to amplify experience; second, to extend the mental horizon of the child; and third, to influence immediate and future conduct. The author calls for an organization from the superintendent down to the room teacher that will provide consciously and definitely for these three things.

No. 35. August 28, 1915. HERBERT P. PATTERSON. *Shall Biological Failures be Our Teachers?* 297-301. The author points out that four out of every five of our teachers are women, and of these the majority who remain in the profession are "old maid school teachers," who are obliged by the dictum that prevails in boards of education to remain biological failures. The author pleads for a fair division of educational influence between men and women; but if for economic reasons, we must depend chiefly on the women, let us at least do away with the superstitious notion that through marriage a teacher unfits herself for the training of children.

B. W. KUNKEL. *The Distinction of College Graduates.* 316-324. A tabulation of the college graduates in the half decades from 1850 to 1900, whose names appear in recent issues of *Who's Who*. It is interesting to know that Amherst leads the list, followed by Dartmouth, Williams, and Wesleyan. It will be noted that universities, such as Harvard, Yale, Columbia, Chicago, Illinois, Wisconsin, etc., are not considered, but that the list is restricted to those institutions confining themselves to undergraduate work. If the figures are computed in terms of per cent. of alumni between 1850 and 1900, Williams leads all the rest, and has almost four times as high a percentage as her nearest competitor, Wesleyan.

No. 37. September 11, 1915. CHARLES N. MOORE. *On Correlation and Disciplinary Values.* 378-385. The author charges those investigators who have attempted to compute the co-efficient of correlation between attainments in different subjects with a highly arbitrary and highly unscientific procedure. He reviews a number of these correlation studies, and has himself computed the correlation of coefficients of 254 high school boys and 198 high school girls for successive grades in algebra and for marks in geometry and English. The correlations between algebra and algebra (boys 0.71, girls 0.65) are not greatly in excess of these between geometry and English (boys 0.52, girls 0.59). The author attempts to discredit the experimental work of the anti-disciplinarians, and to reinstate the belief in formal discipline.

CHANG PING WANG. *The General Effects of Visual Sense Training in Children.* 392-396. Extended experiments with school children led the author to conclude that sense training is a misnomer; that the principal means of transfer is found in the methods of work developed in training, and later on applied in the tests; that the amount of transfer depends upon the efficiency of the method used; and that the method developed in training may be better fitted for the tests.

No. 38. DAVID SPENCE HILL. *Survey of Industries and Mechanical Occupations in New Orleans by the Division of Educational Research.* 421-427, and 461-466. A condensed account of one of the most detailed and thorough vocational surveys that has yet been made. There is, first, a detailed analysis of the percentages of the pupils in each grade with reference to whether they are at age or over age. There follow the occupational history of 1472 boys and men in the night schools, an experimental study of delinquent boys, a study of American trade schools by personal inspection, personal visits to typical industries and occupations of the city, and conferences with both employers and trades unions. The final report, now in the hands of the city council, extends to over four hundred pages.

No. 40. October 2, 1915. FRANK STRONG. *Present Activities and Accomplishments of Higher Education.* 469-474. The author surveys the present status of American universities, pleads for a better balance between teaching and research, and foresees a revival of religious and spiritual ideals.

No. 41. October 9, 1915. EDWARD F. BROWN. *A Firmer Physical Foundation for Education.* 505-514. The author urges better school medical inspection, the devotion of the inspector's full time to the work, and adequate supply and proper training of school nurses, laws to compel parents to carry out the recommendations of the inspectors, and clinics for free treatment of those children whose parents are unable to assume the expense.

MABEL L. ROBINSON. *The Need of Supervision in College Teaching.* 514-519. The author has collected all of the arguments she could find against the supervision of college teaching, and proceeds to show how flimsy they are, and how advantageous such supervision would be for the students, the patrons, and the members of the faculty themselves.

J. B. SEARS. *Spelling Efficiency in the Oakland Schools.* 531-537. 569-574. The Ayres spelling test, as used in Springfield, Butte, and Salt Lake City, was given to 12,985 children of the Oakland schools, and the results here presented in a series of graphs, showing the distribution of results for different grades, and for differences of nationality and social status. The city ranks high as a whole, but the evidence shows that the children are poorly classified as to spelling, and that there are great differences in standards of achievement. Individual and social differences are clearly reflected in the results.

No. 43. October 23, 1915. MAX F. MEYER. *The Administration of College Grades.* 577-589. The author reviews the system of grading that has prevailed in the University of Missouri for the last seven years, and proposes a number of improvements to the scheme. One of these is that the necessary information be furnished by the instructor, but that the students' actual grades be computed, not by the teacher, but by a clerk. Detailed illustrations are given showing how the proposed scheme would function.

DANIEL STARCH. *The Inheritance of Abilities in School Studies*. 608-610. Studies of the records of children from the same family in spelling, reading, writing, and arithmetic give little evidence to support the conclusion that special abilities in certain studies run in families. Ability in school work is apparently inherited to the same extent as physical features, since the coefficients of correlations for children of the same parents are approximately the same for both physical and mental traits.

No. 44. October 30, 1915. FREDERICK S. BREED AND VERNON CULP. *An Application and Critique of the Ayres Handwriting Scale*. 639-647. The tests were given to twenty-five pupils from each of grades V, VI, VII, and VIII, random selection, in fifteen Michigan schools. The authors conclude that, while the Ayres scale was constructed on the basis of legibility, it cannot be regarded as a satisfactory scale for the measurement of the legibility of handwriting. The high correlation between Ayres scale values and Freeman form values tends to confirm the view that the Ayres scale measures form rather than legibility.

No. 46. November 13, 1915. FREDERICK G. BONSER, L. H. BURCH AND MARGARET R. TURNER. *Vocabulary Tests as Measures of School Efficiency*. 713-719. Kirkpatrick's vocabulary test was applied to 2,000 children of the Speyer school in New York City in grades four to eight, and a similar list from another dictionary was given to a small group of children in the same school. The records of the Speyer children were fifty per cent. higher than the Kirkpatrick figures for the corresponding grades, and by the second list the ratings were almost three times as high. Other tests were given in different schools, and the result showed a remarkable variation in vocabulary. The authors attribute the high rating of the Speyer school to the fact that the curriculum and methods of work link themselves organically to the range of ideas and words that are in vogue outside the school.

No. 47. November 20, 1915. ALBERT SHIELS. *The Rating of Teachers in the New York City Public Schools*. 752-754. In order to get some definite information regarding the reliability of ratings of teachers in New York City, ten descriptions of hypothetical cases of teachers were sent to one hundred and thirty-three principals, with a request for a rating in each case. One hundred ten returns were received. Tables of the distribution of ratings are presented, and the results show the necessity of some more detailed analysis of the teacher's function than prevails under the present system.

PUBLICATIONS RECEIVED

FRANK P. BACHMAN. *Problems in Elementary School Administration*.
Yonkers-on-Hudson: World Book Company, 1915. Pp. x, 274.
\$1.50.

The present volume of the School Efficiency Series deals particularly with the problems of the classification and promotion of school children. There is a discussion of the rate of promotion, the size of class and its relation to promotion, absence, over-age, and inability to use the English language in their bearing on promotion, the significance of over-age, and the construction of age-grade reports. The author concludes that part-time and large classes are responsible for the non-promotion of relatively few pupils, that irregular attendance, late entrance to school, and sluggish mentality are the most important factors in preventing promotion.

E. W. BAGSTER-COLLINS. *First Book in German*. New York: The Macmillan Company, 1914. Pp. ix, 342. \$1.10.

This is not a radical text, but attempts to steer a middle course between the advocates of conversational method on the one hand and the strict grammarians on the other. The author believes in an abundance of examples to illustrate grammatical usages and thus supplies much opportunity for conversation. The book is more richly illustrated than most elementary texts.

J. LYNN BARNARD, F. W. CARRIER, ARTHUR WILLIAM DUNN, AND
CLARENCE D. KINGSLEY. *The Teaching of Community Civics*.
Bulletin No. 650. Washington; Bureau of Education, 1915. Pp.
55.

This bulletin was prepared by a special committee of the commission of the National Education Association on the reorganization of secondary education. The bulletin sets forth the aims and methods of community civics and indicates a suggestive treatment of the elements of civic welfare, such as health, recreation, education, civic beauty, wealth, communication, transportation, charities and corrections. There are helpful lists of texts, source materials, and other aids in teaching.

MAURICE A. BIGELOW. *General Science, Nature-Study, and Biology*.
Reprinted from the Nature-Study Review, May, 1915, Pp. 7.

The author proclaims his faith in an introductory course in science that is organized as education rather than as science, and that prepares the way for, but does not displace, the regular sciences of our schools.

W. F. BOOK. *First Annual Report of Vocational Education in Indiana*. Indiana State Board of Education: 1915. Pp. 169-230.

The report includes an account of the work of the state aided vocational departments of schools, of the instruction in elementary agriculture, domestic science, and industrial arts, of the trade extension work, of the county agents of agriculture, of the boys and girls clubs and of the home and school garden movement. The report urges a careful investigation of the occupations and industries of the state, and greater emphasis upon vocational and educational guidance in the upper elementary grades and in the high school.

ISAIAH BOWMAN. *South America—A Geography Reader*. Chicago: Rand-McNally and Company, 1915. Pp. x, 354. \$.75.

This is the second of a series of readers based on selected type-regions, and designed by the editors to bring out with the glow of story and the truth of science the human interest of geography. Each book is written by a specialist on the subject and as Kipling would say "By a man who can handle a pen." The author has spent ten years in the exploration and study of South America and therefore writes as one having authority. The book is richly illustrated and constitutes a valuable addition to the resources of the teacher.

HENRY SEIDEL CANBY. *College Sons and College Fathers*. New York: Harper and Brothers, 1915. Pp. 233. \$1.20.

This is a series of essays on college life and the significance of college education by the assistant professor of English at Yale University. Among the topics chosen for the themes of the author's discourse are the undergraduate, his setting, the professor, college life and college education, culture and prejudice, the colleges and mediocrity, current literature, writing English, and teaching English. The author's style is racy and piquant and his reflections upon college life are interesting, although not entirely complimentary to the undergraduate. The author indulges in an interesting speculation as to the amount of energy expended by a professor in an average recitation. If we assume that "thirty foot-pounds go into the arduous but stimulating process of preparation, and thirty are consumed in the pleasant and invigorating operation of really teaching an aroused and interested class, then a good forty are exhausted, burned up, wasted, in merely overcoming resistance to know—in fighting indifference, and sometimes sullen dislike."

WILLIAM A. COOKE. *Schoolhouse Sanitation. A Study of the Laws and Regulations Governing the Hygiene and Sanitation of Schoolhouses*. Bulletin No. 648. Washington: Bureau of Education, 1915. Pp. 69.

This is an interesting digest of the enactments of the several states with reference to the school site, the water supply, toilets, protection

against fire and panic, lighting, heating, ventilation, cleaning, and furniture and equipment. Perhaps the most significant recent movement is the revolt against the common drinking cup and the common towel.

ELLWOOD P. CUBBERLEY. *The Portland Survey. A Textbook on City School Administration Based on a Concrete Study.* Yonkers-on-Hudson: World Book Company, 1915. Pp. xiv, 441. \$1.50.

Section one deals with organization and administration, with an excellent criticism of that type of school board which regards as its duty the administration of the schools to the smallest detail. Section two deals with instructional needs, criticizes the curriculum as conventionalized, and outlines an educational program adapted to local educational needs. Section three considers buildings and the supervision of health, and Section four deals with attendance, records, and costs. Arithmetic and grammar are the best taught, while reading and composition make a poor showing.

GEORGE VAN NESS DEARBORN. *Economy in Study: Certain Practical Points, Psychological and Physiological on How to Study to the Best Advantage.* Reprinted from the Medical Record, June 5, 1915. Pp. 15.

The author emphasizes as the most important points in successful study an interest in the study, the development of the ability to inhibit all extraneous ideas and distracting stimuli, the multiplication of associations so that the data studied have a logical setting and are not mastered by merely rote learning, fit physical condition, breaking the strain of concentration by brief physical exercise every twenty minutes, and the development of visualizing imagination.

J. C. DEVOSS AND ROSE GANSON. *Color Blindness of Cats.* Reprinted from the Journal of Animal Behavior, Vol. 5, No. 2, March-April, 1915. 115-139.

The color stimuli used were colored papers inside jelly glasses and the test was whether cats could learn to distinguish and react to the proper food glass for thirty successive choices. The authors conclude that cats cannot distinguish any one color from all the shades of gray under light adaptation. It is possible that the animal may be totally color-blind by daylight.

MARCUS DIMSDALE. *A History of Latin Literature.* New York: D. Appleton and Company, 1915. Pp. ix, 549. \$2.00.

This book is intended for the general reader, rather than for the classical expert, and the author has therefore endeavored to represent

the personality of the great Latin writers and to interpret their significance in the development of literature in such a manner as to be appreciated by the ordinary student. One of the most important arguments for the study of the classics is the desirability of becoming familiar with their literature. The opponents of required classical study usually grant this desirability but claim that much greater familiarity could be secured in much shorter time by reading classical authors in translation. For those who advocate such a study of the classics the present history of Latin literature would prove a valuable adjunct to its study.

H. J. FOGHT. *The Rural School System of Minnesota. A Study in School Efficiency.* Bulletin No. 647. Washington: Bureau of Education, 1915. Pp. 156.

The monograph presents a general account of the rural school organization of the state, explains the administration of schools in large undivided school districts, describes the so-called associative schools, gives an account of the consolidation of rural schools, discusses industrial education in rural communities, and gives some attention to the training of teachers for these schools.

H. J. FOGHT. *The School System of Ontario, with Especial Reference to the Rural Schools.* Bulletin No. 659, Washington: Bureau of Education, 1915. Pp. 58.

The bulletin gives a brief sketch of rural conditions in Ontario, the provincial organization of education, recent progress in industrial education, and the preparation and salaries of teachers.

NORMAN FROST. *A Statistical Study of the Public Schools of the Southern Appalachian Mountains.* Bulletin No. 636. Washington: Bureau of Education, 1915. Pp. 71.

A study of the illiteracy of the inhabitants of the mountainous portions of the southern states and the means that are being taken to remedy this condition. The author reports that conditions vary from the very worst to very nearly the best, but are everywhere constantly improving. Teachers' salaries are low and the teachers have little or no professional training. The expenditure for education is very much less than it should be, but public sentiment in favor of good schools is developing.

CHRISTIAN GAUSS. *Through College on Nothing a Year.* New York: Charles Scribner's Sons, 1915. Pp. xv, 174. \$1.00.

A graphic account of the experiences of a boy who was brought up in the slums, and earned his way through Princeton University.

The story is one of enthralling interest, and throws a brilliant light on the opportunities which are open to an energetic young man in almost any of the larger colleges of this country.

HENRY HERBERT GODDARD. *The Criminal Imbecile. An Analysis of Three Remarkable Murder Cases.* New York: The Macmillan Company 1915. Pp. ix, 157. \$1.50.

The recognition of feeble-mindedness as one of the most potent causes of crime leads to new ideas about the prevention of crime and the treatment of criminals. It is to further the spread of such ideas that the present book is written. The cases described here are unique "in that they were the first court cases in which the Binet-Simon tests were admitted in evidence, the mental status of these persons under indictment being largely determined by this method." In addition to the description of the cases there are chapters on the criminal imbecile, on the responsibility of the feeble-minded, and on the punishment for criminal imbeciles. In the latter chapter, the author insists that the old fashioned idea of revenge, which is the underlying motive in punishment, must be given up for the more rational one of protection—protection of society, protection of the weak individual himself. Careful examination of each one of these young murderers would have revealed the fact that they were mental defectives, and, if they had been treated as such, there would have been no opportunity for the crimes they committed. The real criminal act is that committed by society in allowing such individuals to roam at large, the prey of the sinister influences of their environment.

C. JUDSON HERRICK. *An Introduction to Neurology.* Philadelphia: W. B. Saunders Company, 1915. Pp. 355. \$1.75.

Studies in modern psychology and education lay more and more stress upon the structure and functioning of the nervous system. While it is true that the introspectionists claim that the phenomena of consciousness can better be studied without any reference to the nervous system, for an ultimate causal explanation of mental phenomena they are driven to posit nerve impulses and patterns of neural activity. Even in psychology there is a reaction against the introspective analysis of consciousness, as may be seen in the writings of the functionalists and the behaviorists. In education there is a growing tendency to consider the biological organism as a whole and to focus attention upon the adjustments which this organism makes to its environment. For both classes of students therefore the present book will be of value. Written from the point of view of the biologist rather than from that of the medical man, and having as its author one of the most prolific contributors to the subject of comparative neurology in this country, the book is scientific in its construction and authoritative in its pronouncements. There are magnificent

illustrations on almost every page, and each chapter ends with an excellently chosen bibliography of the topic treated. The author points out in his preface that the chief problems of neurology at present are of two sorts: "First, to discover the regional localization within the nervous system of the nerve cells and fibers which serve particular types of functioning, and, second, to discover the chemical or other changes which take place during the nervous functioning, that is, the metabolism of the nervous tissues. The first of these problems is at present further advanced than the second. The larger part of this work is therefore devoted to a description of architectural relations. Without a knowledge of these relations, however, the problems of metabolism are in large measure meaningless."

JOSEPH JASTROW. *Character and Temperament*. New York: D. Appleton and Company, 1915. Pp. xviii, 596. \$2.50.

This is a volume in the Conduct of Mind Series, the purpose of which is "to provide readily intelligible surveys of selected aspects of the study of mind and of its applications." The scope of the work may be seen by the chapter headings which are the scientific approach, the sensibilities, the emotions and conduct, the higher stages of psychic control, temperament and individual differences, abnormal conditions of minds, the psychology of group traits, character and the environment, and the qualities of men. The author states that the subject of the volume is the psychological sources of human quality, and he remarks that "the course followed in this survey is substantially without precedent; although there is considerable community of content with volumes bearing a similar title, and with others that consider the analysis, the emotional basis, and the social expression of human nature." It is a solid, well-wrought volume, which makes no little demand upon the thoughtful attention of the reader.

I. L. KANDEL. *The Training of Elementary School-teachers in Mathematics in the Countries Represented in the International Commission on the Teaching of Mathematics*. Bulletin No. 666. Washington: Bureau of Education, 1915. Pp. 56.

The subject is developed by countries in alphabetical order. In each case an attempt is made to sketch in some detail the work of training schools in arithmetic, algebra, and geometry. Most interesting are the methods of training teachers in elementary mathematics in England and Germany. "No country," the author states, "is making greater progress in the training of its teachers than Germany, and in no subject is this more true than in mathematics." A comparison of the work in different countries is illuminating and instructive.

ALBERT GALLOWAY KELLER. *Societal Evolution. A Study of the Evolutionary Basis of the Science of Society.* New York: The Macmillan Company, 1915. Pp. xi, 338. \$1.50.

The author regards the conception of folk-ways, as developed by Professor Sumner, the link connecting organic and societal evolution. The subjects treated are the evolution of the human type, variation, selection, both automatic and rational, counter-selection, transmission, and adaptation. The book is stimulating and broadening, and furnishes an excellent background for the teacher's life philosophy.

PAUL KLAPPER. *The Teaching of English. Teaching the Art and the Science of Language.* New York: D. Appleton and Company, 1915. Pp. xii, 263. \$1.25.

The author divides his book into two parts: the expressional aspect and the formal aspect of composition. The author agrees neither with the extreme conservatives nor with the ultra-radicals, and tries to steer a middle course, advising much written work in composition with a certain amount of correction and rewriting, if the rewriting is the result of a genuine effort on the student's part to improve the expression of ideas. The rewriting of compositions as penmanship exercises or mere exercises in neatness is condemned. The attacks against formal grammar are recognized and liberal reduction in grammar requirements is urged.

SAMUEL C. KOHS. *New Light on Eugenics.* Reprinted from the *Journal of Heredity*, Volume 6, No. 10. Oct., 1915. Pp. 446-452.

A criticism of some of the sweeping claims made by recent writers on heredity with regard to the inheritance of mental traits. The author believes that an individual's future mental attainments are by no means so far removed from motivation by the individual's personal efforts as many writers seem to imply. There is a bibliography of forty numbers.

ALBERT LEAKE. *Means and Methods of Agricultural Education.* Boston: Houghton Mifflin Company, 1915. Pp. xiii, 273. \$2.00.

The volume discusses the present methods of agricultural education, outlines plans for improvement, and suggests new methods whereby rural schools may be given an education based on their environment and adapted to the needs of rural districts. The treatment is largely historical and reviews the development of agricultural education, the conditions of social life, the rural school, the consolidation of schools, rural school extension, types of secondary education in agriculture, the history of agricultural colleges, farmers' institutes, the status of farm women, and the training of teachers for rural schools. Special attention is called to the exodus of girls from the rural districts, and a strong plea is made for better home conditions on the farm.

E. G. LUTZ. *Practical Drawing. A Book for the Student and the General Reader.* New York: Charles Scribner's Sons, 1915. Pp. 250. \$1.25.

The author believes that drawing from actual objects should not be as difficult as it is usually thought by beginners. To supply a method of attack that will bring results quickly and with satisfaction is the purpose of the book. In general the author proceeds somewhat as the sculptor, blocking out his surface in large outlines and gradually filling in and elaborating details. There are chapters on charcoal and crayon drawing, water color painting, pen and ink drawing, perspective, pictorial composition, lettering, drapery, and drawing materials. The book is radical in its claims and attractive in the promise of speedy attainment which it holds out to the neophyte, but there is room for some skepticism as to whether results will follow with such speed as the writer implies.

CLINTON P. MCCORD. *One Hundred Female Offenders. A Study of the Mentality of Prostitutes and Wayward Girls.* Reprinted from the Journal of Criminal Law and Criminology, Sept., 1915.

The 38 girls tested ranged from 12 to 40 years of age, with an average age of 18. The average mental age was 9 years, while three tested 7 years, and one only 5 years. Only six were rated as normal in intelligence. The study strengthens the impression that much of our social irregularity can be traced to lack of intelligence.

THEODORE L. MACDOWELL. *State Versus Local Control of Elementary Education.* Bulletin No. 649. Washington: Bureau of Education, 1915. Pp. 83.

The monograph gives an extended account of state aid, the right of localities to borrow money and issue bonds, state regulation of the taxing duties and powers of localities, and state intervention in the school finances of localities. In general, elementary school finances indicate divided control, with a fairly strong tendency towards centralization.

JAMES MAHONEY. *Some Foreign Educational Surveys.* Bulletin No. 664. Washington: Bureau of Education, 1915. 49 pp.

A brief account of school surveys made in Switzerland, England, Belgium, Ireland, Scotland, Germany, Austria, France, New South Wales, Sweden, New Zealand, and Canada. In the light of the recent survey activity in this country, it is interesting to note that a survey of gymnasia was undertaken in Austria as early as 1870, while some of the surveys in Scotland and Belgium go back so far as 1850 or even 1842. Indeed, it is probable that most European countries have

long been more critical of their educational facilities than have we in this country, and it is only recently that we have begun to apply the same criteria of efficiency to education that we have long used in industrial and commercial affairs.

ARTURO MONTORI. *Tipos de Apercepcion en un Grupo de Ninas Cubanas*. Havana, 1915. Pp. 164.

In his preliminary remarks the author gives a brief sketch of the development of the study of perception from Charcot and Galton to Stern and Meumann. There are chapters dealing with the philosophical doctrine of perception, and with modern psychological studies of the subject. The experimental portion of the monograph presents the responses of 94 children, from 7 to 16 years of age, to a marine picture with two human figures in the foreground. There is a detailed description of the accounts given by the children and the results are tabulated according to the type of imagination manifested and the character of esthetic emotion elicited.

Part-Time Education in Indianapolis. Prepared by the Committee on Education and approved by the Board of Directors of the Indianapolis Chamber of Commerce. Indianapolis, August, 1914.

Recommends an apprenticeship system to protect children from the "blind alley" jobs, and to train them for genuine productive activity in later life. The committee urges an adoption of a comprehensive plan for vocational education in Indianapolis.

CLARENCE ARTHUR PERRY. *The Extension of Public Education. A Study in the Wider Use of School-Buildings*. Bulletin No. 655. Washington: Bureau of Education, 1915. Pp. 67.

Among the uses to which school buildings are being put, as illustrated in this monograph, are meeting-places for music clubs, dramatic clubs, sewing circles, dancing clubs, social entertainments, basketry clubs, lectures, meetings of various societies, civic meetings, library stations, and elections. The author thinks that this work will undergo still greater and more systematic extension if we are to judge by the trend of present developments and the persistence of the forces behind them.

LOUIS W. RAPEER, Editor. *Educational Hygiene from the Pre-School Period to the University*. New York: Charles Scribner's Sons, 1915. Pp. xix, 650.

This elaborate handbook on health and its relation to the schools is the work of some 27 authors, each distinguished in some particular line of school hygiene activity. Part one, dealing with health sociology

treats of such topics as the public health movement, health and heredity, the home hygiene of children, and the social center as a means for the spread of health propaganda. Part two deals with the administrative aspects of the subject, such as the initiation of work in education hygiene in a school system, the general administration of school health, state co-operation for school health progress, and the serious problem of health in rural schools. Part three deals with medical inspection, including school nurses, public school clinics, open air schools, school feeding, and the exceptional child; with school sanitation both city and rural; with physical education, with especial attention to athletics and recreation; with the teaching of hygiene in elementary and high schools; and with the hygiene of instruction. In part four we have two chapters dealing with the hygiene of men's and women's colleges. There is a brief bibliography of school hygiene literature and an abundance of illustrations.

BURTON EGBERT STEVENSON. *The Home Book of Verse for Young Folks*. New York: Henry Holt and Company, 1915. Pp. xvii, 538. \$2.00.

This is a most admirable collection of verse for children, ranging all the way from mother-goose melodies through charming nonsense jingles, fairy-land lyrics, Christmas poems, nature poems, classic ballads, and songs of patriotism, to the odes of Wordsworth, Shakespeare, Addison and Pope. The reader will find most of the old favorites and many new ones, such for example as the "Song of Sherwood," by Albert Noyes, and "The Fairies of Caldun-Law" by Mary Howitt.

WINIFRED SACKVILLE STONER, JR. *Facts in Jingles*. Indianapolis: The Bobbs-Merrill Company, 1915. Pp. 306. \$1.00.

The public has heard so much about the poetical accomplishments of this young wonder-child that it is a satisfaction to have her productions collected in a single volume and made available for inspection. As Professor O'Shea points out in his introduction the jingles were written by a child for children. They were composed between the ages of five and twelve, and deal with an almost bewildering variety of subjects. A considerable number of them are written in Esperanto, in which language the child is quite an adept. Of particular interest are "A Bony Song," in which the catalogue of the 206 bones of the body is thrown into rhyme, "Thanksgiving in 20,000 A. D.," a clever satire on present tendencies in diet, "I'm Glad I'm not an Exo," an impromptu parody on a pupil's composition on "Bones," and a series of poems on the great musical composers. The volume is illustrated by numerous photographs of the author from the age of three months to thirteen years.

- F. W. TAUSSIG. *Inventors and Money-Makers. Lectures on some Relations between Economics and Psychology, delivered at Brown University in Connection with the Celebration of the 150th Anniversary of the Foundation of the University.* New York: The Macmillan Company, 1915. Pp. ix, 138. \$1.00.

This is a book on instincts, considered from the point of view of the economist. It is true that the modern behaviorist may take exception to the latitude of the use of the term *instinct*, when it is applied in such expressions as the "instinct of barter," "the instinct of contrivance" and "the instinct of devotion," but if we abstract from the peculiarities of terminology, we find much interesting material on the fundamental forces that make for invention and that underlie the amassing of fortunes. Finally the devotion of all one's energy to the pursuit of some goal whether this be the discovery of truth, the construction of a new machine, the finding of resources to supply human wants, or the building up of great organizations of capital, lies at the basis of all that is good and noble and substantial in civilization.

- E. H. TAYLOR. *Mathematics in the Lower and Middle Commercial Schools of Various Countries Represented in the International Commission on the Teaching of Mathematics.* Bulletin No. 662. Washington: Bureau of Education, 1915. Pp. 96.

The bulletin presents a brief but fairly detailed account of the teaching of mathematics in industrial and commercial schools in the leading countries of the world.

- The University and the Municipality. Summary of Proceedings of the First Session of the National Association of Municipal Universities.* Bulletin No. 655. Washington: Bureau of Education, 1915. Pp. 66.

Part one, on the aims and purposes of the urban university, contains addresses by President Dabney of Cincinnati, President Kolbe of Akron, Commissioner Claxton, Dean Schneider of Cincinnati, Dean Burriss of Cincinnati, and President Cockayne of Toledo. Part two gives a brief description of typical urban universities. These include Akron, New York, Pittsburgh, Boston, Buffalo, Johns Hopkins, Toledo, Milliken University, Washington University (St. Louis), Cincinnati, Reed College (Portland), Louisville, Northwestern at Evanston, and the College of the City of New York.





NON-CIRCULATING

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